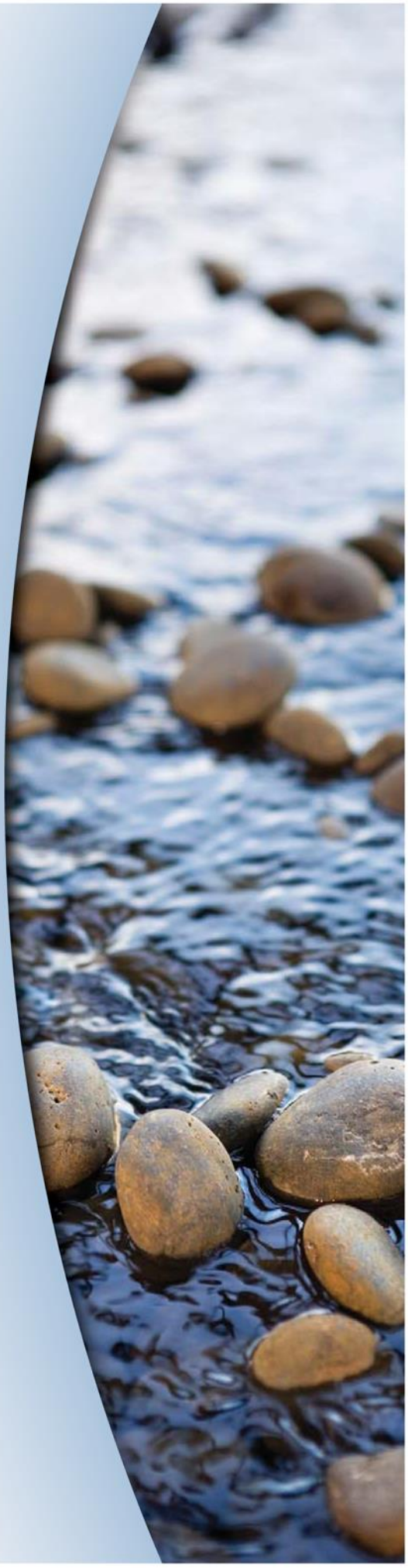

PRELIMINARY WATER QUALITY MANAGEMENT PLAN (WQMP)

MAGNOLIA TANK FARMS

21845 Magnolia Street, Huntington Beach, California
APN 114-150-36 & 114-481-32

Prepared For

SLF HB-Magnolia, LLC
2 Park Plaza, Suite 700
Irvine, CA 92614
949.417.1396

Prepared By

Fuscoe Engineering, Inc.
16795 Von Karman, Suite 100
Irvine, California 92606
949.474.1960
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Project Manager:
Debra Schales, PE

Date Prepared: October 11, 2017
Date Revised: January 23, 2018
Job Number: 1293.007.02

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FUSCOE ENGINEERING
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PRELIMINARY WATER QUALITY MANAGEMENT PLAN (WQMP)

MAGNOLIA TANK FARM

January 23, 2018

1293.007.02

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PRELIMINARY WATER QUALITY MANAGEMENT PLAN (WQMP)

MAGNOLIA TANK FARM

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PRELIMINARY WATER QUALITY MANAGEMENT PLAN (WQMP)

MAGNOLIA TANK FARM

January 23, 2018

1293.007.02

PRELIMINARY
WATER QUALITY MANAGEMENT PLAN (WQMP)

MAGNOLIA TANK FARM

21845 Magnolia Street
City of Huntington Beach, County of Orange

APN 114-150-36 & 114-481-32

Prepared for:

SLF HB-MAGNOLIA, LLC
2 Park Plaza, Suite 700
Irvine, CA 92614
949.417.1396

Prepared by:

FUSCOE ENGINEERING, INC.
16795 Von Karman, Suite 100
Irvine, CA 92618
949.474.1960
Debra Schales, PE

Date Prepared: October 11, 2017
Date Revised: January 23, 2018

PROJECT OWNER'S CERTIFICATION			
Permit/Application No.:	Pending	**Grading Permit No.:**	Pending
Tract/Parcel Map and Lot(s)No.:		**Building Permit No.:**	Pending
Address of Project Site and APN:	21845 Magnolia Street, Huntington Beach, CA 92646 APN 114-150-36 & 114-481-32		

This Water Quality Management Plan (WQMP) has been prepared for SLF HB-MAGNOLIA, LLC by FUSCOE ENGINEERING, INC. The WQMP is intended to comply with the requirements of the County of Orange NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan , including the ongoing operation and maintenance of all best management practices (BMPs), and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP) and the intent of the non-point source NPDES Permit for Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. An appropriate number of approved and signed copies of this document shall be available on the subject site in perpetuity.

OWNER:			
Name:	Pending – to be provided in Final WQMP		
Title:			
Company:			
Address:			
Email:			
Telephone #:			
I understand my responsibility to implement the provisions of this WQMP including the ongoing operation and maintenance of the best management practices (BMPs) described herein.			
Owner Signature:		**Date:**	

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APPENDICES

EXHIBITS & BMP DETAILS (INCLUDED IN SECTION VI)

- Vicinity Map
- Preliminary WQMP Exhibit
- Existing and Proposed Hydrology Exhibits
- Typical Cross Sections
- Greywater Treatment System Details
- StormTrap Details
- Modular Wetland System Details
- Nutrient Separating Baffle Box Details

SECTION I DISCRETIONARY PERMITS AND WATER QUALITY CONDITIONS

PROJECT INFORMATION			
Permit/Application No.:	Pending	**Grading or Building Permit No.:**	Pending
Address of Project Site (or Tract Map and Lot Number if no address) and APN:	21845 Magnolia Street, Huntington Beach, CA 92646 APN 114-150-36 & 114-481-32		
WATER QUALITY CONDITIONS OF APPROVAL OR ISSUANCE			
Discretionary Permit(s):	Pending – to be provided in Final WQMP		
Water Quality Conditions of Approval or Issuance applied to this project: **(Please list verbatim.)**	Pending – to be provided in Final WQMP		
WATERSHED-BASED PLAN CONDITIONS			
Applicable conditions from watershed - based plans including WIHMPs and TMDLs:	None.		

SECTION II PROJECT DESCRIPTION

II.1 PROJECT DESCRIPTION

The proposed Magnolia Tank Farm project site encompasses approximately 29 acres in the City of Huntington Beach. The site is bounded by Magnolia Street on the east, the Huntington Beach Magnolia Marsh and the Huntington Beach Channel on the southwest, and the vacant ASCON property on the north. A Vicinity Map is included in Section VI.

From 1972 until 2009, the Project site was used as a fuel oil storage facility with three above- ground, 45-foot tall, 25-million-gallon fuel storage tanks, and other oil-related infrastructure including roads, pipelines and ancillary buildings. The oil storage tanks provided fuel for the adjacent power generating facility (now owned by AES Southland) until that facility was converted to an all-natural gas facility in the 1990s. Each of the tanks measured approximately 300 feet in diameter. Adjacent land uses include the AES Southland power generating facility to the west of the Channel; single family residences to the east; Magnolia Marsh, Wildlife Conservancy and wetlands to the south; and the vacant ASCON property on the north.

The table below summarizes the proposed project.

DESCRIPTION OF PROPOSED PROJECT	
Development Category (Model WQMP, Table 7.11-2; or 7.11-3):	1. New development projects that create 10,000 square feet or more of impervious surface. This category includes commercial, industrial, residential housing subdivisions, mixed-use, and public projects on private or public property that falls under the planning and building authority or the Permittees.
Project Area (ft^2):	1,262,804ft^2 (29.0 acres)
# of Dwelling Units:	250 (not to exceed)
SIC Code:	Pending – to be provided in Final WQMP
Narrative Project Description:	The proposed project includes the construction of a mixed-use community that includes a residential neighborhood, lodge, and up to 40 beds in a "guesthouse format" that provides lower-cost group overnight accommodations, visitor-serving and neighborhood-supporting retail uses (primarily restaurants), a Coastal Conservation area adjacent to Magnolia Marsh, and Open Space Park areas. In addition, the Specific Plan designates the area adjacent to Magnolia Street (commonly referred to as Squirrel Park) as Open Space Park, along the Project site's entire eastern boundary. This open space area contains a pedestrian trail that will link the Project's visitor-serving and residential uses to a pedestrian trail that will be constructed within the Open Space Conservation area adjacent to the Huntington Beach Channel and the Magnolia Marsh. The maximum development proposed to be permitted by the Specific Plan is shown in the

DESCRIPTION OF PROPOSED PROJECT	
	following table. Further details on the proposed project will be provided in the Final WQMP.

MAXIMUM DEVELOPMENT TABLE				
Development Types	**Maximum Density/Intensity**	**Gross Acres**	**Maximum Development**	**Total Open Space Acres**
Coastal Conservation (CC)				
CC Area	--	2.8	--	2.8
Open Space Parks & Recreation (OS-PR)				
Parks	--	2.9	--	2.9
Residential (RES)				
Residential[3]	15 du/ac	18.9	23.7	--
Visitor-Serving Commercial (VSC)				
Lodge[1]	175 Guest Rooms	4.3	Up to 230,000 GSF (211,000 GSF Lodge & Guesthouse; 19,000 Retail GSF)	--
Guesthouse[2]	40 Beds			
VSC Subtotal	--			
GRAND TOTAL	**175 Guest Rooms & 40 Guesthouse Beds**	**29.0**	**250 Units** / **Up to 23,000 GSF**	**5.7**

Notes:

(1) Lodge shall not be converted to Limited Use Overnight Visitor Accommodations (Timeshares) and shall not exceed four stories above a parking garage.
(2) A Guesthouse provides budget-oriented overnight group accommodation.
(3) RM Residential will not exceed three stories and no apartments are permitted.

GSF = Gross square footage

Project Area:	Pervious Area	Pervious Area Percentage	Impervious Area	Impervious Area Percentage
Pre-Project Conditions:	19.4 ac	67%	9.6 ac	33%
Post-Project Conditions:	12.5 ac	43%	16.5 ac	57%
Drainage Patterns/ Connections:	Under existing conditions, the eastern boundary of the project site is landscape setback that slopes away from the project site. Any runoff that is not naturally infiltrated into the ground will surface flow away from the site in an easterly direction towards Magnolia Street. Flows continue in a northerly direction before draining onto Hamilton Avenue and continuing as surface flow in a westerly direction along Hamilton Avenue. Flows will then be intercepted by an existing catch basin approximately 1 mile from the project site at the intersection of Hamilton Avenue and Surveyor Circle. The runoff then feeds into a pump station located between Surveyor Circle and Newland Street, and ultimately pumps out to the Huntington Beach Channel. The remainder of the site is relatively flat, and runoff drains around the former storage tanks towards the existing pipelines located at the center of the project site. Flows from the pipeline converge at the existing pump station on site that ultimately pumps runoff directly into the Huntington Beach Channel. Under proposed conditions, new storm drains will collect runoff from throughout the site and ultimately discharge to Huntington Beach Channel, similar to existing conditions. Runoff from the majority of the residential areas generally drain towards proposed catch basins along private streets and continue to flow in a westerly direction to the respective downstream point that will divert low flows to the Modular Wetland System (MWS) units for treatment. The remaining residential areas adjacent to the landscape setbacks/open space areas within the western boundary will drain away from the site interior and towards proposed bioretention swales for low flow treatment. Runoff from the street entrances along Magnolia Street will drain in an easterly direction where low flows will be intercepted by MWS units for treatment. All low flows will receive treatment prior to draining into the Huntington Beach Channel, while high flows will bypass treatment and connect directly to the Channel (pending review and approval by the County of Orange Public Works Department). Runoff from the lodge area will collect in a proposed harvest and reuse cistern that will retain the water on site for toilet flushing reuse within the lodge area, and irrigation reuse throughout the project site's common area landscaping. The remaining landscape setbacks, open space, and park areas along the site will drain towards Huntington Beach Channel, with runoff from the eastern boundary pumped and intercepted by area drains to convey flows to the Channel.			

PROJECT FEATURES	
Building Summary:	Single-family detached, attached homes and hotel buildings are proposed as part of the project. Further details on the proposed buildings will be provided in the Final WQMP.
Amenities:	The project provides 2.9 acres of Open Space/Park. Nearly all of this open space will be located on the perimeter of the project site to facilitate use by the public and enhance the Project's visitor-serving recreational amenities. Additional details on proposed amenities will be provided in the Final WQMP. Additionally, a 2.8-acre Coastal Conservation area is being established between the Project site and the Magnolia Marsh. The Coastal Conservation area will contain new ecosystem-based landscape containing native plant communities and a pedestrian trail providing views of the wetlands and the ocean. In addition to functioning as a buffer between development and the wetlands, the native landscaping will serve as upland habitat.
Landscaped Areas:	The project site will include landscaping in the form of landscaped planters, parkways, swales, and landscaping associated with the residential areas as well as the lodge and visitor serving areas. Further details on proposed landscaping will be provided in the Final WQMP. The project also provides 2.9 acres of Open Space/Park. Nearly all of this open space will be located on the perimeter of the project site to facilitate use by the public and enhance the Project's visitor-serving recreational amenities. Additional details on proposed amenities will be provided in the Final WQMP. Additionally, a 2.8-acre Coastal Conservation area is being established between the Project site and the Magnolia Marsh. The Coastal Conservation area will contain new ecosystem-based landscape containing native plant communities and a pedestrian trail providing views of the wetlands and the ocean. In addition to functioning as a buffer between development and the wetlands, the native landscaping will serve as upland habitat.
Parking Facilities:	Parking will be provided throughout the site within garages of the residences, along portions of the proposed streets, and as small surface lots throughout the site for guests, visitors and residents. Additional underground parking structures will be provided for the lodge. Further details on proposed parking facilities will be provided in the Final WQMP.
Other Project Features:	An appropriate number of trash enclosures will be located within the lodge and visitor serving area portion of the project. Specific number and location(s) of the trash enclosure(s) will be documented in the Final WQMP. Any trash enclosures will be covered and walled on 3 sides to preclude rainfall and runoff (gate comprising the fourth side). Any restaurants/food preparation areas included as part of the lodge and visitor serving land uses will be handled indoors, and the eating area tables will be covered with a canopy and designed to preclude precipitation and runoff. Grease interceptors will be located in the sanitary sewer systems where applicable. The site will not have any additional outdoor storage areas, vehicle/ community car wash racks or vehicle/equipment wash areas. In the event site features are added to the proposed Project that are not identified in this WQMP, these

PROJECT FEATURES	
	features will be designed in accordance with the Orange County Drainage Area Management Plan (OC DAMP) Model WQMP requirements and City LIP and verified during the precise grade plan check review process.
Outdoor Activities:	Outdoor areas throughout the site will be used for vehicle parking (in designated spaces), pedestrian access, recreational, open space and lodge and visitor serving event purposes. Common recreational space may include a clubhouse, swimming pool, spa and/or other recreational amenities (details to be provided in Final WQMP). All other outdoor areas will be used for walkways, common areas and landscaped areas.
Materials Stored:	Materials used and stored on site will include those associated with residential and lodge land uses, such as normal cleaning supplies, maintenance materials, and typical office supplies. Materials will be stored totally within the buildings.
Wastes Generated:	The project is not anticipated to generate any wastes other than landscaping clippings and trash & debris. Outdoor trash receptacles will be provided throughout the common areas of the site for the visitors and residents to dispose of their refuse in a proper manner, and property maintenance will provide trash and waste material removal to maintain a trash-free property. All wastes shall be collected and properly disposed of off-site (see Sections IV.3.8 & IV.3.9 for source control BMPs related to these features).

II.2 POTENTIAL STORM WATER POLLUTANTS

The table below, derived from Table 2 of the Countywide Model WQMP Technical Guidance Document (December 2013), summarizes the categories of land use or project features of concern and the general pollutant categories associated with them.

POLLUTANTS OF CONCERN		
Pollutant	**E = Expected to be of concern N =Not Expected to be of concern**	**Additional Information and Comments**
Suspended Solid/ Sediment	E	
Nutrients	E	
Heavy Metals	E	
Pathogens (Bacteria/Virus)	E	
Pesticides	E	
Oil & Grease	E	

POLLUTANTS OF CONCERN		
Pollutant	**E = Expected to be of concern N =Not Expected to be of concern**	**Additional Information and Comments**
Toxic Organic Compounds	E	
Trash & Debris	E	

II.3 HYDROLOGIC CONDITIONS OF CONCERN

The purpose of this section is to identify any hydrologic conditions of concern (HCOC) with respect to downstream flooding, erosion potential of natural channels downstream, impacts of increased flows on natural habitat, etc. As specified in Section 2.3.3 of the 2011 Model WQMP, projects must identify and mitigate any HCOCs. A HCOC is a combination of upland hydrologic conditions and stream biological and physical conditions that presents a condition of concern for physical and/or biological degradation of streams.

In the North Orange County permit area, HCOCs are considered to exist if any streams located downstream from the project are determined to be potentially susceptible to hydromodification impacts and either of the following conditions exists:

- Post-development runoff volume for the 2-yr, 24-hr storm exceeds the pre-development runoff volume for the 2-yr, 24-hr storm by more than 5 percent

or

- Time of concentration (Tc) of post-development runoff for the 2-yr, 24-hr storm event exceeds the time of concentration of the pre-development condition for the 2-yr, 24-hr storm event by more than 5 percent.

If these conditions do not exist or streams are not potentially susceptible to hydromodification impacts, an HCOC does not exist and hydromodification does not need to be considered further. In the North Orange County permit area, downstream channels are considered not susceptible to hydromodification, and therefore do not have the potential for a HCOC, if all downstream conveyance channels that will receive runoff from the project are engineered, hardened, and regularly maintained to ensure design flow capacity, and no sensitive habitat areas will be affected.

Is the proposed project potentially susceptible to hydromodification impacts?

☐ **Yes** ☒ **No (show map)**

According to Figure XVI-3c within the Technical Guidance Document, the proposed project falls within an area not susceptible to hydromodification impacts. All runoff from the site ultimately drains to the

Huntington Beach Channel, which is improved and maintained by the Orange County Flood Control District. A copy of Figure XVI-3c is included in Appendix A.

II.4 POST DEVELOPMENT DRAINAGE CHARACTERISTICS

Under proposed conditions, new storm drains will collect runoff from throughout the site and ultimately discharge to Huntington Beach Channel, similar to existing conditions. Runoff from the majority of the residential areas generally drain towards proposed catch basins along private streets and continue to flow in a westerly direction to the respective downstream point that will divert low flows to the Modular Wetland System (MWS) units for treatment. The remaining residential areas adjacent to the landscape setbacks/open space areas within the western boundary will drain away from the site interior and towards proposed bioretention swales for low flow treatment. Runoff from the street entrances along Magnolia Street will drain in an easterly direction where low flows will be intercepted by MWS units for treatment. All low flows will receive treatment prior to draining into the Huntington Beach Channel, while high flows will bypass treatment and connect directly to the Channel (pending review and approval by the County of Orange Public Works Department).

Runoff from the lodge area will collect in a proposed harvest and reuse cistern that will retain the water on site for toilet flushing reuse within the lodge area, and irrigation reuse throughout the project site's common area landscaping. The remaining landscape setbacks, open space, and park areas along the site will drain towards Huntington Beach Channel, with runoff from the eastern boundary pumped and intercepted by area drains to convey flows to the Channel.

II.5 PROPERTY OWNERSHIP/MANAGEMENT

PROPERTY OWNERSHIP/MANAGEMENT	
Public Streets:	Not Applicable
Private Streets:	SLF HB-Magnolia, LLC / HOA
Landscaped Areas:	SLF HB-Magnolia, LLC / HOA
Open Space:	Public: City of Huntington Beach Private: SLF HB-Magnolia, LLC / HOA
Easements:	Various public utility agencies
Parks:	Public: City of Huntington Beach Private: SLF HB-Magnolia, LLC / HOA
Buildings:	SLF HB-Magnolia, LLC / HOA
Structural BMPs:	SLF HB-Magnolia, LLC / HOA

A Home Owners Association (HOA) will be formed upon project completion. The HOA will be responsible for inspecting and maintaining all BMPs prescribed for Magnolia Tank Farm. Until a HOA is formally established, SLF HB Magnolia, LLC shall assume all BMP maintenance and inspection responsibilities for the proposed project. Inspection and maintenance responsibilities are outlined in Section V of this report.

The Owner, SLF HB Magnolia, LLC shall assume all BMP maintenance and inspection responsibilities for the lodge and visitor serving portion of the proposed project. Inspection and maintenance responsibilities are outlined in Section V of this report.

SECTION III SITE DESCRIPTION

III.1 PHYSICAL SETTING

Planning Area/ Community Name:	Magnolia Tank Farm
Address:	21845 Magnolia Street, Huntington Beach, CA 92646
Project Area Description:	Northwest of the intersection of Magnolia Street and Banning Avenue in the City of Huntington Beach.
Land Use:	Existing: Public Proposed: Residential, Open Space, Commercial Visitor
Zoning:	Existing: Public-Semi Public (PS) with Oil and Coastal Zone Overlays Proposed: Specific Plan Overlay
Acreage:	29.0 ac
Predominant Soil Type:	C
Impervious Conditions:	Existing Impervious: 33% (67% Pervious) Proposed Impervious: 57% (43% Pervious)

III.2 SITE CHARACTERISTICS

Precipitation Zone:	0.7 inches
Topography:	The site is relatively flat and generally slopes from the northwest to the southeast with an elevation range from 4.3 to 12.5 feet (NAVD88), with an average elevation of approximately 8.4 feet (NAVD88). Elevations of the site are measured using the North American Vertical Datum NAVD88.
Existing Drainage Patterns/ Connections:	Under existing conditions, the eastern boundary of the project site is landscape setback that slopes away from the project site. Any runoff that is not naturally infiltrated into the ground will surface flow away from the site in an easterly direction towards Magnolia Street. Flows continue in a northerly direction before draining onto Hamilton Avenue and continuing as surface flow in a westerly direction along Hamilton Avenue. Flows will then be intercepted by an existing catch basin approximately 1 mile from the project site at the intersection of Hamilton Avenue and Surveyor Circle. The runoff then feeds into a pump station located between Surveyor Circle and Newland Street, and ultimately pumps out to the Huntington Beach Channel. The remainder of the site is relatively flat, and runoff drains around the former storage tanks towards the existing pipelines located at the center of the project site. Flows from the pipeline converge at the existing pump station on site that ultimately pumps runoff directly into the Huntington Beach Channel.

Proposed Drainage Patterns/ Connections:	Under proposed conditions, new storm drains will collect runoff from throughout the site and ultimately discharge to Huntington Beach Channel, similar to existing conditions. Runoff from the majority of the residential areas generally drain towards proposed catch basins along private streets and continue to flow in a westerly direction to the respective downstream point that will divert low flows to the Modular Wetland System (MWS) units for treatment. The remaining residential areas adjacent to the landscape setbacks/open space areas within the western boundary will drain away from the site interior and towards proposed bioretention swales for low flow treatment. Runoff from the street entrances along Magnolia Street will drain in an easterly direction where low flows will be intercepted by MWS units for treatment. All low flows will receive treatment prior to draining into the Huntington Beach Channel, while high flows will bypass treatment and connect directly to the Channel (pending review and approval by the County of Orange Public Works Department). Runoff from the lodge area will collect in a proposed harvest and reuse cistern that will retain the water on site for toilet flushing reuse within the lodge area, and irrigation reuse throughout the project site's common area landscaping. The remaining landscape setbacks, open space, and park areas along the site will drain towards Huntington Beach Channel, with runoff from the eastern boundary pumped and intercepted by area drains to convey flows to the Channel.
Soil Type, Geology, and Infiltration Properties:	Soils on the project site generally consist of undocumented fill and Quaternary age Young Axial Channel Deposits. The undocumented fill consists of very moist, grey-brown silty clay, elastic silt and sandy silt with clay. The fill encountered was present from the ground surface extending to depths of approximately 2.5 feet relative to the basin elevations of approximately 4 to 6 feet above MSL. The Quaternary Young Axial Channel Deposits were encountered in all borings to depths explored. The materials consist of an upper layer of clay/silty-clay/elastic silt/silt and an underlying layer of silty sand, sandy silt, and poorly graded sand with silt.
Hydrogeologic (Groundwater) Conditions:	During the preliminary geotechnical investigations, groundwater was encountered at depths ranging between 5 to 7 feet. Depth to historically high groundwater is 3 feet below ground surface in the vicinity of the property. The project site is located in an area with shallow (or high) groundwater levels, approximately between 5-10 feet below bgs as illustrated in the TGD Figure XVI-2e (see Appendix F).
Geotechnical Conditions (relevant to infiltration):	Due to the presence of shallow groundwater on-site, infiltration BMPs are considered infeasible.
Off-Site Drainage:	None.

Utility and Infrastructure Information:	The proposed Project will also include the installation of on-site storm drain, water quality, water, sewer, electricity, natural gas, and telecommunications infrastructure systems to serve the proposed land uses. The on-site utility infrastructure would connect to existing utilities in the vicinity of the Project site or new utility lines that would be installed in the roadways adjacent to or within the project site.

III.3 WATERSHED DESCRIPTION

Receiving Waters:	The proposed Project discharges directly into Huntington Beach Channel. Huntington Beach Channel discharges into Talbert Channel downstream of the project which then discharges into the Pacific Ocean at Huntington Beach State Park.
303(d) Listed Impairments:	**Huntington Beach Channel** – none **Talbert Channel** – none **Pacific Ocean at Huntington Beach State Park** – PCBs
Applicable TMDLs:	None.
Pollutants of Concern for the Project:	Suspended Solid/ Sediment, Nutrients, Heavy Metals, Pathogens (Bacteria/Virus), Pesticides, Oil & Grease, Toxic Organic Compounds, Trash & Debris
Hydrologic Conditions of Concern (HCOCs):	None. See Section II.3 for further details.
Environmentally Sensitive and Special Biological Significant Areas:	None.

SECTION IV BEST MANAGEMENT PRACTICES (BMPs)

IV.1 PROJECT PERFORMANCE CRITERIA

Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implementing LID on regional or sub-regional basis?

☐ Yes ☒ No

PROJECT PERFORMANCE CRITERIA	
Hydromodification Control Performance Criteria: (Model WQMP Section 7.II-2.4.2.2)	If a hydrologic condition of concern (HCOC) exists, priority projects shall implement onsite or regional hydromodification controls such that: ▪ Post-development runoff volume for the two-year frequency storm does not exceed that of the predevelopment condition by more than five percent, and ▪ Time of concentration of post-development runoff for the two-year storm event is not less than that for the predevelopment condition by more than five percent. Where the Project WQMP documents that excess runoff volume from the two-year runoff event cannot feasibly be retained and where in-stream controls cannot be used to otherwise mitigate HCOCs, the project shall implement on-site or regional hydromodification controls to: ▪ Retain the excess volume from the two-year runoff event to the MEP, and ▪ Implement on-site or regional hydromodification controls such that the post-development runoff two-year peak flow rate is no greater than 110 percent of the predevelopment runoff two-year peak flow rate.
LID Performance Criteria: (Model WQMP Section 7.II-2.4.3)	Infiltrate, harvest and use, evapotranspire, or biotreat/biofilter, the 85th percentile, 24-hour storm event (Design Capture Volume). LID BMPs must be designed to retain, on-site, (infiltrate, harvest and use, or evapotranspire) storm water runoff up to 80 percent average annual capture efficiency.
Treatment Control BMP Performance Criteria: (Model WQMP Section 7.II-3.2.2)	If it is not feasible to meet LID performance criteria through retention and/or biotreatment provided on-site or at a sub-regional/regional scale, then treatment control BMPs shall be provided on-site or offsite prior to discharge to waters of the US. Sizing of treatment control BMP(s) shall be based on either the unmet volume after claiming applicable water quality credits, if appropriate.

PROJECT PERFORMANCE CRITERIA	
LID Design Storm Capture Volume:	DCV = C × d × A × 43560 sf/ac × 1/12 in/ft Where: DCV = design storm capture volume, cu-ft C = runoff coefficient = (0.75 × imp + 0.15) Imp = impervious fraction of drainage area (ranges from 0 to 1) d = storm depth (inches) A = tributary area (acres) Imp = 57% d = 0.7 inches A = 29.0 acres *DCV* = *(0.75 x* 0.57 *+0.15) x* 0.7 *inches x* 29.0 *ac x 43560 sf/ac x 1/12 in/ft* = 42,550 ft^3 *Refer to Section IV.2.2 for specific Drainage Manage Area (DMA) breakdown and Appendix A for detailed calculations (Worksheet B).*

IV.2 SITE DESIGN AND DRAINAGE PLAN

The following section describes the site design BMPs used in this project and the methods used to incorporate them. Careful consideration of site design is a critical first step in storm water pollution prevention from new developments and redevelopments.

IV.2.1 Site Design BMPs

Minimize Impervious Area

Impervious surfaces have been minimized by incorporating landscaped areas over substantial portions of the site including common areas, parkways, medians, in addition to larger parks and open space areas. The streets and sidewalks will be designed with minimum width requirements to minimize impervious surfaces where feasible.

Maximize Natural Infiltration Capacity

Infiltration is not recommended for the project site due to proximity to groundwater. Refer to Section IV.3.2 for details.

Preserve Existing Drainage Patterns and Time of Concentration

Runoff from the site will continue to flow similar to existing conditions. Low-flows and first-flush runoff will drain to either an underground gallery for harvest & reuse, bioretention swales, or Modular Wetland Systems for water quality treatment.

Disconnect Impervious Areas

Landscaping will be provided adjacent to sidewalks and between the proposed residential buildings. Where feasible, sidewalks will drain to adjacent landscaping. Open space areas are proposed along Magnolia Street and the Huntington Beach Channel along the perimeter of the site. Dry weather flows and low flows from the project areas will be routed through low impact development (LID) BMPs with vegetation characteristics in accordance with the Model WQMP criteria.

Protect Existing Vegetation and Sensitive Areas, and Revegetate Disturbed Areas

There are no existing vegetated or sensitive areas to preserve on the project site. All disturbed areas will either be paved or landscaped.

Xeriscape Landscaping

Xeriscape landscaping is not proposed for the project. However, native and/or tolerant landscaping will be incorporated into the site design consistent with City guidelines.

IV.2.2 Drainage Management Areas

In accordance with the MS4 permit and the 2011 Model WQMP, the project site has been divided into Drainage Management Areas (DMAs) to be utilized for defining drainage areas and sizing LID and other treatment control BMPs. DMAs have been delineated based on the proposed site grading patterns, drainage patterns, storm drain and catch basin locations.

The design capture volumes (DCV) and treatment flow rates (Q_{Design}) for each DMA are summarized in the table below. These have been derived utilizing the "Simple Method" in accordance with the TGD Section III.1.1. Actual BMP sizing requirements, including 80 percent capture design volumes, flow rates, depths, and other design details for the specific BMPs proposed are provided in Sections IV.3.1, IV.3.3 and IV.3.4 below. Locations of DMAs and associated LID and treatment BMPs are identified on the exhibits in Section VI. Additional calculations and TGD Worksheets are provided in Appendix A.

DRAINAGE MANAGEMENT AREAS (DMAs)								
DMA/ Drainage Area ID[1]	Tributary Drainage Area (ft^2)	Tributary Drainage Area (ac)	% Imp.	Design Storm Depth[2] (in)	Tc (min)	Rainfall Intensity[3] (in/hr)	Simple Method DCV[4] (ft^3)	Q_{Design} [5] (cfs)
DMA 1	48,352	1.11	65%	0.7	5	0.26	1,799	0.184
DMA 2	558,004	12.81	65%	0.7	14.47	0.22	20,767	1.798
DMA 3	232,175	5.33	65%	0.7	12.17	0.22	8,641	0.748
DMA 4	3,920	0.09	98%	0.7	8.42	0.24	202	0.019
DMA 5	3,920	0.09	98%	0.7	8.42	0.24	202	0.019
DMA 6	158,123	3.63	90%	0.7	5	0.26	7,610	0.779
DMA 7	6,534	0.15	98%	0.7	16.28	0.21	337	0.028

DRAINAGE MANAGEMENT AREAS (DMAs)								
DMA 8	5,663	0.13	98%	0.7	16.28	0.21	292	0.024
DMA 9	117,612	2.70	5%	0.7	5	0.26	1,290	0.132
DMA 10	17,860	0.41	5%	0.7	5	0.26	196	0.020
DMA 11	15,682	0.36	5%	0.7	5	0.26	172	0.018
DMA 12	87,991	2.02	5%	0.7	5	0.26	965	0.099
DMA 13	6,970	0.16	5%	0.7	5	0.26	76	0.008
TOTAL SITE	1,262,804	29.0	57%	0.7	--	--	42,550	3.875

Notes:
1. Refer to exhibits in Section VI for locations of each DMA.
2. Per Figure XVI-1 of the Technical Guidance Document, dated December 20, 2013. See also Appendix A.
3. Per Figure III.4 of the Technical Guidance Document, dated December 20, 2013. See also Appendix A, and Section 6 for hydrology maps detailing time of concentration.
4. Per Section III.1.1 of the Technical Guidance Document.
5. Per Section III.3.3 and Worksheet D of the Technical Guidance Document.

IV.3 LID BMP SELECTION AND PROJECT CONFORMANCE ANALYSIS

Low Impact Development (LID) BMPs are required in addition to site design measures and source controls to reduce pollutants in storm water discharges. LID BMPs are engineered facilities that are designed to retain or biotreat runoff on the project site. The 4th Term MS4 Storm Water Permit (Order R8-2009-0030) requires the evaluation and use of LID features using the following hierarchy of treatment: infiltration, evapotranspiration, harvest/reuse, and biotreatment. The following sections summarize the LID BMPs proposed for the project in accordance with the permit hierarchy and performance criteria outlined in Section IV.1.

IV.3.1 Hydrologic Source Controls (HSCs)

Hydrologic source controls (HSCs) can be considered to be a hybrid between site design practices and LID BMPs. HSCs are distinguished from site design BMPs in that they do not reduce the tributary area or reduce the imperviousness of a drainage area; rather they reduce the runoff volume that would result from a drainage area with a given imperviousness compared to what would result if HSCs were not used.

HYDROLOGIC SOURCE CONTROLS		
ID	Name	Included?
HSC-1	Localized on-lot infiltration	☐
HSC-2	Impervious area dispersion (e.g. roof top disconnection)	☒
HSC-3	Street trees (canopy interception)	☐

HYDROLOGIC SOURCE CONTROLS		
ID	Name	Included?
HSC-4	Residential rain barrels (not actively managed)	☐
HSC-5	Green roofs/Brown roofs	☐
HSC-6	Blue roofs	☐
HSC-7	Impervious area reduction (e.g. permeable pavers, site design)	☐

The proposed open space and landscape buffer areas along Magnolia Street and the Huntington Beach Channel will utilize HSCs (DMAs 9 through 13,). Within these areas small portions of hardscape areas (sidewalks) will drain to adjacent landscaping for treatment via filtration. Based on the capture efficiency calculations, the large amounts of landscaping and pervious surfaces in these areas are sufficient to treat runoff from the adjacent impervious surfaces in accordance with the Model WQMP and TGD (meeting 80% minimum average annual capture efficiency). Areas, calculations and associated worksheets are included in Appendix A.

HYDROLOGIC SOURCE CONTROL BMP SUMMARY						
DMA ID[1]	HSC Type	Drainage Area	Pervious to Impervious Ratio Tributary to HSC	$d_{HSC\ total}$[2]	% Capture by HSC [3]	Sufficient?
DMA 9	HSC-2 Impervious Area Dispersion	2.70	19	1.00″	80%	Yes
DMA 10	HSC-2 Impervious Area Dispersion	0.41	19	1.00″	80%	Yes
DMA 11	HSC-2 Impervious Area Dispersion	0.36	19	1.00″	80%	Yes
DMA 12	HSC-2 Impervious Area Dispersion	2.02	19	1.00″	80%	Yes
DMA 13	HSC-2 Impervious Area Dispersion	0.16	19	1.00″	80%	Yes

Notes:

1. Refer to Section IV.3.1 for individual DMA tributary areas. Refer to exhibits in Section VI for locations of BMPs.
2. Per chart in Fact Sheet HSC-2 of the Technical Guidance Document, dated December 20, 2013. Per Fact Sheet HSC-2, the maximum d_{HSC} is equal to the Design Storm Depth for the project (0.7″).
3. Per Table III.1 of the Technical Guidance Document, dated December 20, 2013. Worksheets are included in Appendix A.

IV.3.2 Infiltration BMPs

Infiltration BMPs are LID BMPs that capture, store and infiltrate storm water runoff. These BMPs are engineered to store a specified volume of water and have no design surface discharge (underdrain or outlet structure) until this volume is exceeded. Examples of infiltration BMPs include infiltration trenches, bioretention without underdrains, drywells, permeable pavement, and underground infiltration galleries.

INFILTRATION		
ID	**Name**	**Included?**
INF-3 INF-4	Bioretention Without Underdrains	☐
	Rain Gardens	☐
	Porous Landscaping	☐
	Infiltration Planters	☐
	Retention Swales	☐
INF-2	Infiltration Trenches	☐
INF-1	Infiltration Basins	☐
INF-5	Drywells	☐
INF-7	Subsurface Infiltration Galleries	☐
--	French Drains	☐
INF-6	Permeable Asphalt	☐
	Permeable Concrete	☐
	Permeable Concrete Pavers	☐
	Other:	☐

Due to the presence of shallow groundwater, on-site infiltration of storm water runoff is considered infeasible. Infiltration BMPs are not recommended, since the minimum separation of 10 ft below the bottom of the infiltration system and groundwater cannot be met (most infiltration systems are at least 1 ft in depth below ground surface). Refer to Appendix F for further details.

IV.3.3 Evapotranspiration & Rainwater Harvesting BMPs

Evapotranspiration BMPs are a class of retention BMPs that discharges stored volume predominately to ET, though some infiltration may occur. ET includes both evaporation and transpiration, and ET BMPs may incorporate one or more of these processes. BMPs must be designed to achieve the maximum feasible ET, where required to demonstrate that the maximum amount of water has been retained on-site. Since ET is not the sole process in these BMPs, specific design and sizing criteria have not been developed for ET-based BMPs.

EVAPOTRANSPIRATION		
ID	**Name**	**Included?**
--	HSCs, *see Section IV.3.1*	☒
--	Surface-based infiltration BMPs	☐
--	Biotreatment BMPs, see *Section VI.3.4*	☒
	Other:	☐

Harvest and use (aka. Rainwater Harvesting) BMPs are LID BMPs that capture and store storm water runoff for later use. These BMPs are engineered to store a specified volume of water and have no design surface discharge until this volume is exceeded. Harvest and use BMPs include both above-ground and below-ground cisterns. Examples of uses for harvested water include irrigation, toilet and urinal flushing, vehicle washing, evaporative cooling, industrial processes and other non-potable uses.

HARVEST & REUSE / RAINWATER HARVESTING		
ID	**Name**	**Included?**
HU-1	Above-ground cisterns and basins	☐
HU-2	Underground detention	☒
--	Other:	☐

In order to quantify harvested water demand for the common areas of the project, the Modified Estimated Applied Water Use (EAWU) method was used, consistent with Appendix X of the Model WQMP's Technical Guidance Document (TGD), dated December 20, 2013.

The Modified EAWU method is modified from the OC Irrigation Code (County Ordinance No. 09-010) to account for the wet season demand and storm events (assuming that no irrigation would be applied for approximately 30% of the days in the wet season). The method of calculating the project site's Modified EAWU has been adjusted to account for both landscape irrigation and toilet flushing demands. While irrigation reuse will be applied to the entire site, only common area landscaping (e.g. open space, parks) is counted towards the total irrigable acreage (individual homeowner lots were not included in the total irrigable acreage). The total pervious acreage of the project site is approximately 12.2 acres, of which 5.7 acres are open space (i.e., DMAs 9-13). The remaining 6.5 acres accounts for all

landscaping in the residential and lodge areas, and along the private streets. Of the remaining acreage, we assumed less than half as common area, and the remaining areas as private homeowner landscaping, which results in approximately 8.55 acres of irrigable landscape. At approximately 8.55 acres, the landscape demand for the project site is approximately 10,003 gpd.

The projected toilet demand within the lodge has an estimated demand of 2,800 gpd (see calculations below). Toilet use demand is based on assuming one toilet per 175 rooms (which is likely an underestimate of total toilets within the lodge) with a conservative estimate of 2 occupants per room. The 1.6 gallon per flush estimate is based on an assumed ultra low flush toilet requirement of all new construction in California (refer to Table X.1 of the TGD). Five (5) flushes per day is based off a study conducted by the US EPA and Aquacraft on two single family studies: Water and Energy Savings from High Efficiency Fixtures and Appliances in Single Family Homes - Volume 1 (2005) and Aquacraft Analysis of Water Use in New Single-Family Homes (2011).

$$175\ rooms \times 2\ \frac{occupants}{room} \times 1.6\ gpf \times 5\ flushes\ per\ day = 2{,}800\ gpd$$

The total Modified EAWU for the project site based on irrigation (10,003 gpd) and toilet demand (2,800 gpd) is 12,803 gpd.

For a system to be considered "feasible", the system must be designed with a storage volume equal to the DCV from the tributary area and achieve more than 40% capture. The system must also be able to drawdown in 30 days to meet the 40% capture value. In addition, Table X.6 of the Technical Guidance Document sets forth the demand thresholds for minimum partial capture.

TABLE X.6: HARVESTED WATER DEMAND THRESHOLDS FOR MINIMUM PARTIAL CAPTURE

Design Capture Storm Depth, inches	Wet Season Demand Required for Minimum Partial Capture, gpd per impervious acre
0.60	490
0.65	530
0.70	570
0.75	610
0.80	650
0.85	690
0.90	730
0.95	770
1.00	810

The following table summarizes the estimated applied water use for the common area landscaping of the project.

ESTIMATED APPLIED WATER USE (EAWU) FOR PROJECT SITE									
DMA	Total Area (ac)	% Impervious	Impervious Tributary (ac)	Irrigated LS Area (ac)	ETo_{Wet} [1] (in/mo)	K_L [2]	Modified EAWU (gpd)[3]	Modified EAWU per impervious acre (gpd/ac)	Minimum Capture Threshold [4] (gpd/ac)
DMA 6	3.63	90%	3.27	8.55	2.93	0.55	12,803	3,919	570
Design Capture Volume (gal)				56,920	Drawdown (days)				4.4

Notes:

1 Per Table X.2 for Santa Ana Region (similar climate type), Model WQMP Technical Guidance Document, dated December 2013.
2 Per Table X.4 of the Model WQMP Technical Guidance Document, dated December 2013.
3 Modified EAWU has been calculated based on combined total of landscape architect's average daily irrigation use estimate (890 gpd) and toilet demand use (2,320 gpd) (see calculations above)
4 Per Table X.6 of Model WQMP Technical Guidance Document, dated December 2013

As shown above, the project site has sufficient water demand during the wet season to support harvest and reuse. The project meets the minimum capture threshold of 570 gallons per day/acre with its combined Modified EAWU based on irrigation and toilet use demand. Drawdown of the DCV is anticipated to take approximately 4.4 days by the landscape water demand usage and toilet demand, which is less than the maximum drawdown time of 30 days. Therefore, water reuse is deemed feasible for the lodge portion of the project site. In addition, to ensure this system reaches 80% capture efficiency, the cistern(s) will be upsized by 1.2x the DCV for DMA 6 (see Figure III.2 in Appendix A) to ensure that there will be capacity within the cisterns if subsequent storm events were to occur.

A separate plumbing system for indoor water use will be incorporated to deliver the treated rain water to the toilets in addition to a potable water system. Treatment standards for the indoor water reuse of rain water will follow public health code requirements and the NSF-350 certification process. A separate purple pipe irrigation system will also be incorporated for entire site landscape irrigation following public health code requirements which varies on irrigation type (i.e. spray versus drip). Details on irrigation type and associated treatment requirements will be provided in the Final WQMP.

The storm water harvest & reuse system that stores and reuses runoff for water quality purposes will likely be combined with greywater reuse system within the lodge. The greywater system treats and reuses greywater from lodge sinks, showers and potentially a cooling tower/HVAC system to provide a constant supply of water for daily water reuse. The greywater will be treated and reused toilet flushing and irrigation for the entire site's common area landscaping. While the harvest and reuse system will provide an opportunity to reuse rain water during the wet season, the greywater system will maximize the efficiency and use of the system by providing a daily reuse of potable domestic water which will greatly reduce potable water demands. Both systems will work in tandem to reduce the lodge building's demand and dependence on the City's potable domestic water supply. Further information regarding the harvest reuse and greywater system will be provided in the Final WQMP.

Harvest and Reuse Cistern

One underground harvest and reuse cistern for reuse onsite will be installed in DMA 6 that will receive storm water runoff. At 7,610 ft^3 in DMA 6 (or approximately 56,920 gallons), the water quality DCV has a capture efficiency of roughly 70% and a drawdown time greater than 48 hours. Therefore, the proposed harvest and reuse cistern capacity will be upsized by a factor of 1.2 to 9,132 ft^3 (or approximately 68,304 gallons) in order to meet 80% capture efficiency to account for subsequent rain events. The harvest and reuse system will consist of one cistern (from StormTrap DoubleTrap or similar, to be determined in Final WQMP) with a footprint of 1,160 ft^2, depth of 8', a total storage capacity of approximately 9,280 ft^3, which is greater than the minimum required gallons needed to meet 80% capture efficiency. Depending on space constraints, multiple cisterns may be designed that will provide enough capacity to satisfy water quality requirements.

Runoff from DMA 6 will surface flow into area drains within the drainage area, where low flows will be pre-treated and diverted into the cistern for onsite reuse while high flows beyond the DCV of 7,610 ft^3 (or approximately 56,920 gallons) will bypass the harvest and reuse system and connect into the storm drain system. The additional storage within the water quality cistern will be utilized in the case of a subsequent storm after 48 hours. Refer to Harvest & Reuse Irrigation Demand Calculations in Appendix A for further information and calculations on DCV and multiplier needed to meet 80% capture efficiency.

IV.3.4 Biotreatment BMPs

Biotreatment BMPs are a broad class of LID BMPs that reduce storm water volume to the maximum extent practicable, treat storm water using a suite of treatment mechanisms characteristic of biologically active systems, and discharge water to the downstream storm drain system or directly to receiving waters. Treatment mechanisms include media filtration (though biologically-active media), vegetative filtration (straining, sedimentation, interception, and stabilization of particles resulting from shallow flow through vegetation), general sorption processes (i.e., absorption, adsorption, ion-exchange, precipitation, surface complexation), biologically-mediated transformations, and other processes to address both suspended and dissolved constituents. Examples of biotreatment BMPs include bioretention with underdrains, vegetated swales, constructed wetlands, and proprietary biotreatment systems.

BIOTREATMENT		
ID	**Name**	**Included?**
BIO-1	Bioretention with underdrains	☐
	Storm Water planter boxes with underdrains	☐
	Bioretention swales with underdrains	☒
BIO-5	Constructed wetlands	☐
BIO-2	Vegetated swales	☐
BIO-3	Vegetated filter strips	☐
BIO-7	Proprietary vegetated biotreatment systems	☒

BIOTREATMENT		
ID	Name	Included?
BIO-4	Wet extended detention basin	☐
BIO-6	Dry extended detention basins	☐
--	Other:	☐

Since infiltration is considered infeasible and harvest and reuse will be utilized for only a portion of the project site to the MEP, biotreatment BMPs will be utilized for the remaining on-site portions for water quality treatment, including a Modular Wetland System unit and bioretention swales with underdrains. These biotreatment systems were selected based on their ability to treat the project's pollutants of concerns to a medium or high effectiveness, in accordance with the Model WQMP and TGD requirements. The table below summarizes the overall treatment effectiveness for bioretention swales and Modular Wetland Systems, derived from Table 4.2 of the Technical Guidance Document and testing data provided by the manufacturer. Additional details on the proposed BMPs are included in Section VI of this WQMP.

POLLUTANTS OF CONCERN AND PERFORMANCE RATINGS		
Pollutant of Concern [1]	Treatment Effectiveness	
	Bioretention System [2]	Modular Wetlands Proprietary Bioretention Units [3]
Suspended Solids/Sediments	High	High
Nutrients	Low	Medium-High
Metals	High	Medium
Pathogens/Bacteria	Medium	Medium-High
Pesticides	N/A	N/A
Oil & Grease	High	High
Toxic Organic Compounds	Medium	N/A[4]
Trash & Debris	High	High

Notes:
1 See Section II.2 of this WQMP.
2 Per Table 4.2 of the Model WQMP's companion Technical Guidance Document dated May 19, 2011.
3 Based on Washington State University Technology Assessment Protocol – Ecology (TAPE) third-party independent field tests for a high-flow biotreatment system with raised under drain (Modular Wetland System-Linear). Refer to manufacturer documentation (attached) for specific removal efficiencies and source references.
Field and Lab Testing demonstrates 75-83% removal rates of Chemical Oxygen Demand (COD), a measure of the amount of organic pollutants commonly found in surface water. COD removals of this range would fall within the Medium-High effectiveness category.

Modular Wetland Systems

Modular Wetlands by Modular Wetlands Systems, Inc. are proprietary biotreatment systems that utilize multi-stage treatment processes including screening media filtration, settling, and biofiltration. The pre-treatment chamber contains the first three stages of treatment, and includes a catch basin inlet filter to capture trash, debris, gross solids and sediments, a settling chamber for separating out larger solids, and a media filter cartridge for capturing fine TSS, metals, nutrients, and bacteria. Runoff then flows through the wetland chamber where treatment is achieved through a variety of physical, chemical, and biological processes. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded and sequestered by the soil and plants, functioning similar to bioretention systems. The discharge chamber at the end of the unit collects treated flows and discharges back into the storm drain system.

Nine (9) total Modular Wetland System (MWS) units will be installed within the project site, five (5) of which will be located within the residential development areas of DMAs 2 & 3. Runoff from these residential areas will generally drain towards proposed catch basins along the proposed interior street and continue to flow in a westerly direction to the respective downstream point that will divert low flows to the MWS units for treatment before connecting to the new storm drain line draining to Huntington Beach Channel. Three (3) MWS-L-8-24 units are proposed to treat runoff for DMA 2 while two (2) MWS-L-8-16 units are proposed to treat DMA 3. The remaining four (4) MWS units will be located within the street entrances off Magnolia Street, one on each side of the street, and will intercept and treat low flow runoff from these drive aprons before draining onto Magnolia Street. All treated low flows will be treated by the respective MWS unit before draining into the Huntington Beach Channel, while high flows beyond the treatment capacity of the MWS units will bypass the units and flow directly to the Huntington Beach Channel.

In accordance with the Model WQMP and TGD, the bioretention/biotreatment BMPs will be sized to treat runoff from the Design Capture Storm (85th percentile, 24-hour). Since Modular Wetlands are sized based on flow rate, they were sized utilizing the methodology for flow based BMPs (TGD Section III.1.2 and Worksheet D). Locations and tributary drainage areas are shown on the WQMP Exhibit included in Section VI. BMP details are also included in Section VI. Detailed calculations and associated TGD Worksheets are included in Appendix A. Operation and maintenance details are included in Section V and Appendix D (O&M Plan).

MODULAR WETLAND SYSTEM DESIGN SUMMARY

DMA ID[1]	Area (ac)	% Imp.	2-Year Tc (min)[3]	Rainfall Intensity (in/hr)	Q_{Design}[4] (cfs)	Size / Model[5]	Model Treatment Capacity	Quantity	Combined Treatment Capacity [6] (cfs)
2	12.81	65%	14.47	0.22	1.798	MWS-L-8-24	0.693	3	2.079
3	5.33	65%	12.17	0.22	0.748	MWS-L-8-16	0.462	2	0.924
4	0.09	98%	8.42	0.24	0.019	MWS-L-4-4	0.052	1	0.052
5	0.09	98%	8.42	0.24	0.019	MWS-L-4-4	0.052	1	0.052
7	0.15	98%	16.28	0.21	0.028	MWS-L-4-4	0.052	1	0.052

MODULAR WETLAND SYSTEM DESIGN SUMMARY									
DMA ID[1]	Area (ac)	% Imp.	2-Year Tc (min)[3]	Rainfall Intensity (in/hr)	Q_{Design}[4] (cfs)	Size / Model[5]	Model Treatment Capacity	Quantity	Combined Treatment Capacity [6] (cfs)
8	0.13	98%	16.28	0.21	0.024	MWS-L-4-4	0.052	1	0.052

Notes:
(1) See also Section IV.2.2.
(2) Refer to WQMP Exhibit in Section VI for locations of each drainage area and BMP.
(3) Refer to Proposed Hydrology exhibit in Section VI for specified Tc.
(4) Detailed calculations and worksheets are included in Appendix A.
(5) Unit details and specifications are included in Section VI.
(6) Treatment capacities of each unit are based on wetland media design loading rate (controlled by downstream orifice) and perimeter surface area of wetland media provided. Individual unit sizing calculations provided by the manufacturer are included on each cut sheet/detail included in Section VI.

Bioretention Swales with Underdrains

Bioretention swales with underdrains will be integrated into the landscaping areas to filter/treat runoff from the proposed building and hardscape areas prior to discharging off-site. Bioretention swales with underdrains are plant-based biotreatment systems that typically consist of a ponding area, mulch layer, planting soils and plants. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded and sequestered by the soil and plants. Underdrains collect the treated water and return it back into the storm drain system.

Bioretention swales will be placed in DMA 1 to meet the minimum square footage requirements needed to adequately treat the DMA's calculated runoff volume. The proposed facility length is subject to change and will be finalized in the Final WQMP. Runoff from the surrounding areas and rooftops will drain towards the bioretention swale for treatment prior to draining to the proposed storm drain line. Runoff will continue and connect to the existing public storm drain line before ultimately draining to the Huntington Beach Channel. The bioretention swale will be installed along the landscape setback along the Huntington Beach Channel within DMA 1 and will have an average ponding depth of 6 inches and a bottom width of 3 feet.

In accordance with the Model WQMP and TGD, the bioretention/biotreatment BMPs will be sized to treat runoff from the Design Capture Storm (85th percentile, 24-hour). The bioretention swale have been sized utilizing the "Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs" in accordance with TGD Section III.3.2 and Worksheet C, to achieve the target capture efficiency of 80%. Detailed calculations and associated TGD Worksheets are included in Appendix A. Refer to Water Quality Management Plan Site Map located in Section 6, for locations and GPS coordinates. Operation and maintenance details are included in Section V and Appendix D (O&M Plan).

BIORETENTION SWALE DESIGN SUMMARY

DMA[1]	Total Drainage Area[2]	% Imp.	Fraction of Design Capture Storm Depth (in/hr)[3,4]	80% Capture Design Storm Depth (in)[4]	80% Capture DCV (ft^3)[4]	BMP Ponding Depth (ft)	BMP Width (ft)	BMP Length (ft^2	BMP Volume Treated (ft^3)
DMA 1	1.11	65%	0.27	0.189	486	0.5	3	400	600

Notes:

1. Refer to WQMP Exhibit in Section VI for locations of DMA and BMPs.
2. Refer to Section IV.2.2 for individual DMA tributary areas.
3. Per Figure III.2 of the TGD.
4. Per Worksheet C, "Determining Capture Efficiency of Volume Based, Constant Drawdown BMP based on Design Volume. Copies are included in Appendix A.

IV.3.5 Hydromodification Control BMPs

Not applicable. Refer to Section II.3 for further information.

IV.3.6 Regional/Sub-Regional LID BMPs

Not applicable. LID BMPs will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

IV.3.7 Treatment Control BMPs

Treatment control BMPs can only be considered if the project conformance analysis indicates that it is not feasible to retain the full design capture volume with LID BMPs.

TREATMENT CONTROL BMPs		
ID	Name	Included?
TRT-1	Sand Filters	☐
TRT-2	Cartridge Media Filter	☐
PRE-1	Hydrodynamic Separation Device	☒
PRE-2	Catch Basin Insert	☒
	Other:	☐

While treatment control BMPs will not be used as the primary water quality treatment on site, treatment control BMPs will be incorporated as pre-treatment prior to low flow runoff entering the proposed detention gallery. A hydrodynamic separator (BIoClean Nutrient Separating Baffle Box or equivalent certified full capture system – see additional details below regarding required full capture devices), will provide pre-treatment prior to storage in the cistern.

The Bio Clean NSBB Hydrodynamic Separator is an advanced storm water treatment system utilizing chambered separation to settle and remove large to fine sediments from storm water runoff. The

Hydrodynamic Separator also includes an oil skimmer containing hydrocarbon booms to capture and permanently retain oils & grease. The design of the skimmer allows the boom to float up and down with the changing water level for enhanced performance.

The Hydrodynamic Separator efficiently removes total suspended solids, hydrocarbons, nutrients, metals and debris/organics from storm water runoff. The system can be designed to be on-line, treating 100% of the flow with minimal head loss through the structure. Refer to Section VI for additional details and performance data for the Hydrodynamic Separator systems.

The table below summarizes the design of the pre-treatment systems. All DMAs will utilize the same Hydrodynamic Separator. Further details on pre-treatment BMP design are included in Section VI. Detailed calculations are provided in Section IV.8.

PRE-TREATMENT CONTROL BMP DESIGN SUMMARY				
DMA	**Acreage**	**Minimum Treatment Rate (Q_{Design})**	**BMP Design**	**BMP Treatment Capacity**
DMA 6	3.63	0.779 cfs	Bio Clean Hydrodynamic Separator NSBB-4-6.5-72	0.868 cfs

In addition to pretreatment controls for the harvest and reuse cistern, the California State Water Resources Control Board has adopted Trash Provisions for all sites with Priority Land Uses (PLUs). PLUs for permittees are defined as, "high density residential, industrial, commercial, mixed urban, and public transportation stations." As the Magnolia Tank Farm project fits the description of the PLU, certified full capture devices are required to be installed in catch basins to ensure compliance with the Trash Provisions.

The Project proposes to include connector pipe screen (CPS) units (or other certified full capture system) in all catch basins on the property. CPS assembly is installed inside a catch basin, in front of the outlet pipe, for preventing debris from entering the storm drain system. A CPS unit is designed to retain all trash and gross solids larger than 5 mm (0.197 in) inside the catch basin (e.g. cigarette buds). See Section VI for typical cross section details of a CPS unit.

As the lodge will be draining to the harvest and reuse cistern that will include a pretreatment device that will be certified as full capture, additional full capture devices will not be required for that drainage area.

IV.3.8 Non-Structural Source Control BMPs

The table below indicates all BMPs to be incorporated in the project. For those designated as not applicable (N/A), a brief explanation why is provided.

NON-STRUCTURAL SOURCE CONTROL BMPs				
ID	Name	Included?	Not Applicable?	If Not Applicable, Provide Brief Reason
N1	Education for Property Owners, Tenants and Occupants	☒	☐	
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☒	☐	
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	Non-industrial development.
N6	Local Water Quality Permit Compliance	☐	☒	The City of Huntington Beach does not issue water quality permits.
N7	Spill Contingency Plan	☐	☒	Hazardous materials will not be stored on-site.
N8	Underground Storage Tank Compliance	☐	☒	No underground storage tanks are proposed.
N9	Hazardous Materials Disclosure Compliance	☐	☒	Hazardous materials will not be stored on-site.
N10	Uniform Fire Code Implementation	☐	☒	Hazardous materials will not be stored on-site.
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☐	☒	No loading docks are proposed.
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	

N1, Education for Property Owners, Tenants and Occupants

Educational materials will be provided to tenants, including brochures and restrictions to reduce pollutants from reaching the storm drain system. Examples include tips for pet care, household tips, and proper household hazardous waste disposal. Tenants will be provided with these materials by the property management prior to occupancy, and periodically thereafter. Refer to Section VII for a list of materials available and attached to this WQMP. Additional materials are available through the County of Orange Stormwater Program website (http://ocwatersheds.com/PublicEd/) and the California

Stormwater Quality Association's (CASQA) BMP Handbooks (http://www.casqa.org/resources/bmp-handbooks).

N2, Activity Restrictions

The Owner/HOA shall develop ongoing activity restrictions that include those that have the potential to create adverse impacts on water quality. Activities include, but are not limited to: handling and disposal of contaminants, fertilizer and pesticide application restrictions, litter control and pick-up, and vehicle or equipment repair and maintenance in non-designated areas, as well as any other activities that may potentially contribute to water pollution.

N3, Common Area Landscape Management

Management programs will be designed and implemented by the Owner/HOA to maintain all the common areas within the project site. These programs will cover how to reduce the potential pollutant sources of fertilizer and pesticide uses, utilization of water-efficient landscaping practices and proper disposal of landscape wastes by the owner/developer and/or contractors.

N4, BMP Maintenance

The Owner/HOA will be responsible for the implementation and maintenance of each applicable non-structural BMP, as well as scheduling inspections and maintenance of all applicable structural BMP facilities through its staff, landscape contractor, and/or any other necessary maintenance contractors. Details on BMP maintenance are provided in Section V of this WQMP, and the O&M Plan is included in Appendix D.

N11, Common Area Litter Control

The Owner/HOA will be responsible for performing trash pickup and sweeping of littered common areas on a weekly basis or whenever necessary. Responsibilities will also include noting improper disposal materials by the public and reporting such violations for investigation.

N12, Employee Training

All employees of the Owner/HOA and any contractors will require training to ensure that employees are aware of maintenance activities that may result in pollutants reaching the storm drain. Training will include, but not be limited to, spill cleanup procedures, proper waste disposal, housekeeping practices, etc.

N14, Common Area Catch Basin Inspection

All on-site catch basin inlets and drainage facilities shall be inspected and maintained by the Owner/HOA at least once a year, prior to the rainy season, no later than October 1st of each year.

N15, Street Sweeping Private Streets and Parking Lots

The Owner/HOA shall be responsible for sweeping all on-site streets, drive aisles, and parking areas within the project on a quarterly basis.

IV.3.9 Structural Source Control BMPs

The table below indicates all BMPs to be incorporated in the project. For those designated as not applicable (N/A), a brief explanation why is provided.

STRUCTURAL SOURCE CONTROL BMPs				
ID	Name	Included?	Not Applicable?	If Not Applicable, Provide Brief Reason
S1 SD-13	Provide storm drain system stenciling and signage	☒	☐	
S2 SD-34	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒	
S3 SD-32	Design and construct trash and waste storage areas to reduce pollution introduction	☒	☐	
S4 SD-12	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☒	☐	
S5	Protect slopes and channels and provide energy dissipation	☒	☐	
S6 SD-31	Properly Design: Dock areas	☐	☒	No loading docks are proposed.
S7 SD-31	Properly Design: Maintenance bays	☐	☒	No maintenance bays are proposed.
S8 SD-33	Properly Design: Vehicle wash areas	☐	☒	No vehicle wash areas are proposed.
S9 SD-36	Properly Design: Outdoor processing areas	☐	☒	No outdoor material storage areas are proposed.
S10	Properly Design: Equipment wash areas	☐	☒	No equipment wash areas are proposed.
S11 SD-30	Properly Design: Fueling areas	☐	☒	No fueling areas are proposed.
S12 SD-10	Properly Design: Hillside landscaping	☐	☒	Project is not located on a hillside.
S13	Properly Design: Wash water control for food preparation areas	☒	☐	
S14	Properly Design: Community car wash racks	☐	☒	No community car wash racks are proposed.

S1/SD-13, Provide storm drain system stenciling and signage

The phrase "NO DUMPING! DRAINS TO OCEAN", or an equally effective phrase approved by the City, will be stenciled on all major storm drain inlets within the project site to alert the public to the destination of pollutants discharged into storm water. Stencils shall be in place prior to release of certificate of occupancy. Stencils shall be inspected for legibility on an annual basis and re-stenciled as necessary.

S3/SD-32, Design and construct trash and waste storage areas to reduce pollution introduction

All trash and waste shall be stored in containers that have lids or tarps to minimize direct precipitation into the containers. Number and location(s) of any trash enclosures will be identified in the Final WQMP. The trash storage areas will be designed to City standards, and will be walled, roofed, have gates and proper drainage per City standards.

S4/SD-12, Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control

The Owner/HOA will be responsible for the installation and maintenance of all common landscape areas utilizing similar planting materials with similar water requirements to reduce excess irrigation runoff. The Owner/HOA will be responsible for implementing all efficient irrigation systems for common area landscaping including, but not limited to, provisions for water sensors and programmable irrigation cycles. This includes smart timers, rain sensors, and moisture shut-off valves. The irrigation systems shall be in conformance with water efficiency guidelines. Systems shall be tested twice per year, and water used during testing/flushing shall not be discharged to the storm drain system.

S5, Protect slopes and channels and provide energy dissipation

The site drainage design shall include appropriate BMPs to decrease the potential for erosion of slopes and/or channels. The design shall be consistent with Federal, State, and local standards (e.g., RWQCB, ACOE, CDFG). Where feasible, the following principles shall be considered: 1) convey runoff safely from the tops of slopes, 2) avoid disturbing steep or unstable slopes, as well as natural channels, 3) implement a permanent stabilization BMP on disturbed slopes and channels as quickly as possible, such as native vegetation, and 4) install energy dissipaters at the outlets of new storm drains, culverts, or channels.

S13, Properly Design: Wash water control for food preparation areas

All wash water from food prep areas will be controlled and proper staff training conducted by the site operator. Food preparation facilities shall meet all health and safety, building and safety and any other applicable regulations, codes requirements, including installation of a grease interceptor where required. Sinks shall be contained with sanitary sewer connections for disposal of wash waters containing kitchen and food wastes.

IV.4 ALTERNATIVE COMPLIANCE PLAN

IV.4.1 Water Quality Credits

Local jurisdictions may develop a water quality credit program that applies to certain types of development projects after they first evaluate the feasibility of meeting LID requirements on-site. If it is not feasible to meet the requirements for on-site LID, project proponents for specific project types can apply credits that would reduce project obligations for selecting and sizing other treatment BMPs or participating in other alternative programs.

WATER QUALITY CREDITS	
Credit	**Applicable?**
Redevelopment projects that reduce the overall impervious footprint of the project site.	☐
Brownfield redevelopment, meaning redevelopment, expansion, or reuse of real property which may be complicated by the presence or potential presence of hazardous substances, pollutants or contaminants, and which have the potential to contribute to adverse ground or surface water quality if not redeveloped.	☐
Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance)	☐
Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g. reduced vehicle trip traffic with the potential to reduce sources of water or air pollution).	☐
Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned	☐
Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping).	☐
Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.	☐
Developments in a city center area.	☐
Developments in historic districts or historic preservation areas.	☐
Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria to mixed use development; would not be able to take credit for both categories.	☐

WATER QUALITY CREDITS	
Credit	**Applicable?**
In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.	☐

Not applicable. Water quality credits will not be applied for the project. LID BMPs will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

IV.4.2 Alternative Compliance Plan Information

Not applicable. LID BMPs will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

SECTION V INSPECTION/MAINTENANCE RESPONSIBILITY FOR BMPs

It has been determined that the Owner, SLF HB-Magnolia, LLC, shall assume all BMP inspection and maintenance responsibilities for the Magnolia Tank Farm project until an HOA is establish and maintenance responsibility is transferred.

Contact Name:	Pending – to be provided in Final WQMP
Title:	
Company:	
Address:	
Phone:	
Fax:	
Email:	

Should the maintenance responsibility be transferred at any time during the operational life of Magnolia Tank Farm, such as when an HOA or POA is formed for a project, a formal notice of transfer shall be submitted to the City of Huntington Beach at the time responsibility of the property subject to this WQMP is transferred. The transfer of responsibility shall be incorporated into this WQMP as an amendment.

The Owner/HOA shall verify BMP implementation and ongoing maintenance through inspection, self-certification, survey, or other equally effective measure. The certification shall verify that, at a minimum, the inspection and maintenance of all structural BMPs including inspection and performance of any required maintenance in the late summer / early fall, prior to the start of the rainy season. A form that may be used to record implementation, maintenance, and inspection of BMPs is included in Appendix D.

The City of Huntington Beach may conduct verifications to assure that implementation and appropriate maintenance of structural and non-structural BMPs prescribed within this WQMP is taking place at the project site. The Owner/HOA shall retain operations, inspections and maintenance records of these BMPs and they will be made available to the City or County upon request. All records must be maintained for at least five (5) years after the recorded inspection date for the lifetime of the project.

Long-term funding for BMP maintenance shall be funded through fees paid into the HOA. SLF HB-Magnolia, LLC, which will set up the HOA shall oversee that adequate funding for BMP maintenance is included within the HOA fee structure including annual maintenance fees and long-term maintenance reserve funds.

The Operations and Maintenance (O&M) Plan can be found in Appendix D.

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
HYDROLOGIC SOURCE CONTROL (HSC) BMPs				
HSC-2	Impervious Area Dispersion	In conjunction with routine landscaping maintenance activities, maintain vegetative cover and/or mulch to eliminate exposed soils. Any eroded surfaces to be repaired immediately. Inspections to be performed twice each year (spring and fall) and after major storm events to check for signs of erosion, gullies, and sloughing.	Monthly	Owner/HOA
HARVEST & USE BMPs				
HU-2	Underground Detention: Cistern	Inspect system via the maintenance port for infiltration of collected runoff after major rain events and at least semi-annually, once prior to the rainy season and once after the rainy season. Ensure that facility drains within 48-72 hours. Should drawdown times get significantly reduced due to sediment build-up, flush system by injecting high pressure water via the maintenance port and remove sediment laden water via sump pump.	2x per year Inspections Cleanout Annually (min.)	Owner/HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
	Greywater Treatment Process System	The greywater processing system includes a proprietary software to allow for fully automated control of the entire process of greywater harvesting. The control system will monitor system mechanicals and water levels in the storage tank. The software should be reviewed daily to observe for proper processing system functionality. Additional information on inspection and maintenance to be provided once treatment system is determined in final design.	Software to be checked daily. Additional treatment system inspection and maintenance to be determined in final design.	Owner/HOA
BIOTREATMENT BMPs				

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
BIO-1	Bioretention Swale with Underdrain	Inspect BMPs semi-annually or after major storm events to check for maintenance needs and function. Routine maintenance shall be performed in conjunction with routine maintenance activities to ensure consistently high performance and extend facility life. Routine maintenance activities include: ▪ Maintain vegetation and media to perpetuate a robust vegetative and microbial community (thin/trim vegetation, replace spent media and mulch). ▪ Periodically remove dead vegetative biomass to prevent export of nutrients or clogging of the system. ▪ Remove accumulated sediment before it significantly interferes with system function. ▪ Conduct maintenance to prevent surface clogging (surface scarring, raking, mulch replacement, etc.). ▪ Maintain splash blocks/energy dissipation and scour-protection as required based on facility inspection. ▪ Routinely remove accumulated sediment at the inlet and outlet and trash and debris from the area. ▪ Repair torn or broken liners as necessary.	2x per year	Owner/HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
BIO-7	Proprietary Biotreatment: Modular Wetland Systems (MWS)	The Modular Wetland units shall be maintained in accordance with manufacturer's specifications. The system shall be inspected at a minimum of once every six months, prior to the start of the rainy season (October 1) each year, and after major storm events. Typical maintenance includes: ▪ Removing trash & debris from the catch basin screening filter (by hand). ▪ Removal of sediment and solids in the settlement chamber (vacuum truck). ▪ Replacement of the BioMediaGREEN™ filter cartridge and drain-down filter (if equipped) ▪ Trim plants within the wetland chamber as needed in conjunction with routine landscape maintenance activities. No fertilizer shall be used. ▪ Wetland chamber should be inspected during rain events to verify flow through the system. If little to no flow is observed from the lower valve or orifice plate, the wetland media may require replacement.	2x per year	Owner/HOA
TREATMENT CONTROL BMPs				

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	**Inspection/Maintenance Activities**	**Minimum Frequency**	**Responsible Party**
PRE-1	Hydrodynamic Separator	Typical maintenance includes inspecting the system at a minimum of once every six months. The cleaning and debris removal maintenance from the settling chamber a minimum of once year and replacement of hydrocarbon booms once a year. The procedure is easily done with the use of any standard vacuum truck. Media shall be replaced when it has become 75% clogged, typically once per year at a minimum. Additional information is provided in Appendix D	2x per year Inspections Cleanout Annually (min.)	Owner/HOA
NON-STRUCTURAL SOURCE CONTROL BMPs				
N1	Education for Property Owners, Tenants and Occupants	Educational materials will be provided to tenants annually. Materials to be distributed are found in Appendix C of the Final WQMP. Tenants will be provided these materials by the HOA prior to occupancy and annually thereafter.	Annually	Owner/HOA
N2	Activity Restrictions	The Owner/HOA will prescribe activity restrictions to protect surface water quality, through lease terms or other equally effective measure, for the property. Restrictions include, but are not limited to, prohibiting vehicle maintenance or vehicle washing.	Ongoing	Owner/HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
N3	Common Area Landscape Management	Maintenance shall be consistent with City requirements. Fertilizer and/or pesticide usage shall be consistent with County Management Guidelines for Use of Fertilizers (OC DAMP Section 5.5) as well as local requirements. Maintenance includes mowing, weeding, and debris removal on a weekly basis. Trimming, replanting, and replacement of mulch shall be performed on an as-needed basis to prevent exposure of erodible surfaces. Trimmings, clippings, and other landscape wastes shall be properly disposed of in accordance with local regulations. Materials temporarily stockpiled during maintenance activities shall be placed away from water courses and storm drain inlets.	Monthly	Owner/HOA
N4	BMP Maintenance	Maintenance of structural BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP (Appendix D). Records of inspections and BMP maintenance shall be kept by the Owner/HOA and shall be available for review upon request.	Ongoing	Owner/HOA
N11	Common Area Litter Control	Litter patrol, violations investigations, reporting and other litter control activities shall be performed on a weekly basis and in conjunction with routine maintenance activities.	Weekly	Owner/HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
N12	Employee Training	The Owner/HOA shall educate all new employees/ managers on storm water pollution prevention, particularly good housekeeping practices, prior to the start of the rainy season (October 1). Refresher courses shall be conducted as needed. Materials that may be utilized on BMP maintenance are included in Appendix D.	Annually	Owner/HOA
N14	Common Area Catch Basin Inspection	On-site catch basin inlets and other drainage facilities shall be inspected at least once per year, prior to the start of the rainy season (October 1st). Inlets and other facilities shall be cleaned when the sump is 40% full and annually at a minimum.	Annually	Owner/HOA
N15	Street Sweeping Private Streets and Parking Lots	Streets, parking areas and alleyways within the project shall be swept at a minimum frequency quarterly as well as once per year prior to the storm season, no later than October 1 each year.	Quarterly	Owner/HOA
STRUCTURAL SOURCE CONTROL BMPs				
S1 SD-13	Provide storm drain system stenciling and signage	On-site storm drain stencils shall be inspected for legibility, at minimum, once prior to the storm season, no later than October 1 each year. Those determined to be illegible will be re-stenciled as soon as possible.	Annually	Owner/HOA
S3 SD-32	Design and construct trash and waste storage areas to reduce pollution introduction	Sweep trash area at least once per week and before October 1st each year. Maintain area clean of trash and debris at all times.	Weekly	Owner/HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
S4 SD-12	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	In conjunction with routine maintenance, verify that landscape design continues to function properly by adjusting systems to eliminate overspray to hardscape areas and to verify that irrigation timing and cycle lengths are adjusted in accordance to water demands, given the time of year, weather, and day or nighttime temperatures. System testing shall occur once per year. Water from testing/flushing shall be collected and properly disposed to the sewer system and shall not discharge to the storm drain system.	Monthly	Owner/HOA
S5	Protect slopes and channels and provide energy dissipation	In conjunction with routine landscape maintenance activities, verify that slopes and channels do not exhibit erosive conditions (exposed soils) by ensuring that they are properly vegetated and stabilized.	Monthly	Owner/HOA
S13	Properly Design: Wash water control for food preparation areas	Inspection / maintenance shall occur at least once in the late summer / early fall, prior to the start of the rainy season. Maintenance includes using dry cleanup methods for cleaning (i.e., sweeping), keeping spill kits on-site and stocked, properly storing and hauling used oil and grease, and disposing wash water to sanitary sewer. Wash water shall not discharge to storm drain system. Mats shall be cleaned indoors or with dry cleaning methods only.	Annually	Owner

Any waste generated from maintenance activities will be disposed of properly. Wash water and other waste from maintenance activities is not to be discharged or disposed of into the storm drain system. Clippings from landscape maintenance (i.e. prunings) will be collected and disposed of properly off-site, and will not be washed into the streets, local area drains/conveyances, or catch basin inlets.

SECTION VI SITE PLAN AND DRAINAGE PLAN

The exhibits provided in this section are to illustrate the post construction BMPs prescribed within this WQMP. Drainage flow information of the proposed project, such as general surface flow lines, concrete or other surface drainage conveyances, and storm drain facilities are also depicted. All structural source control and treatment control BMPs are shown as well.

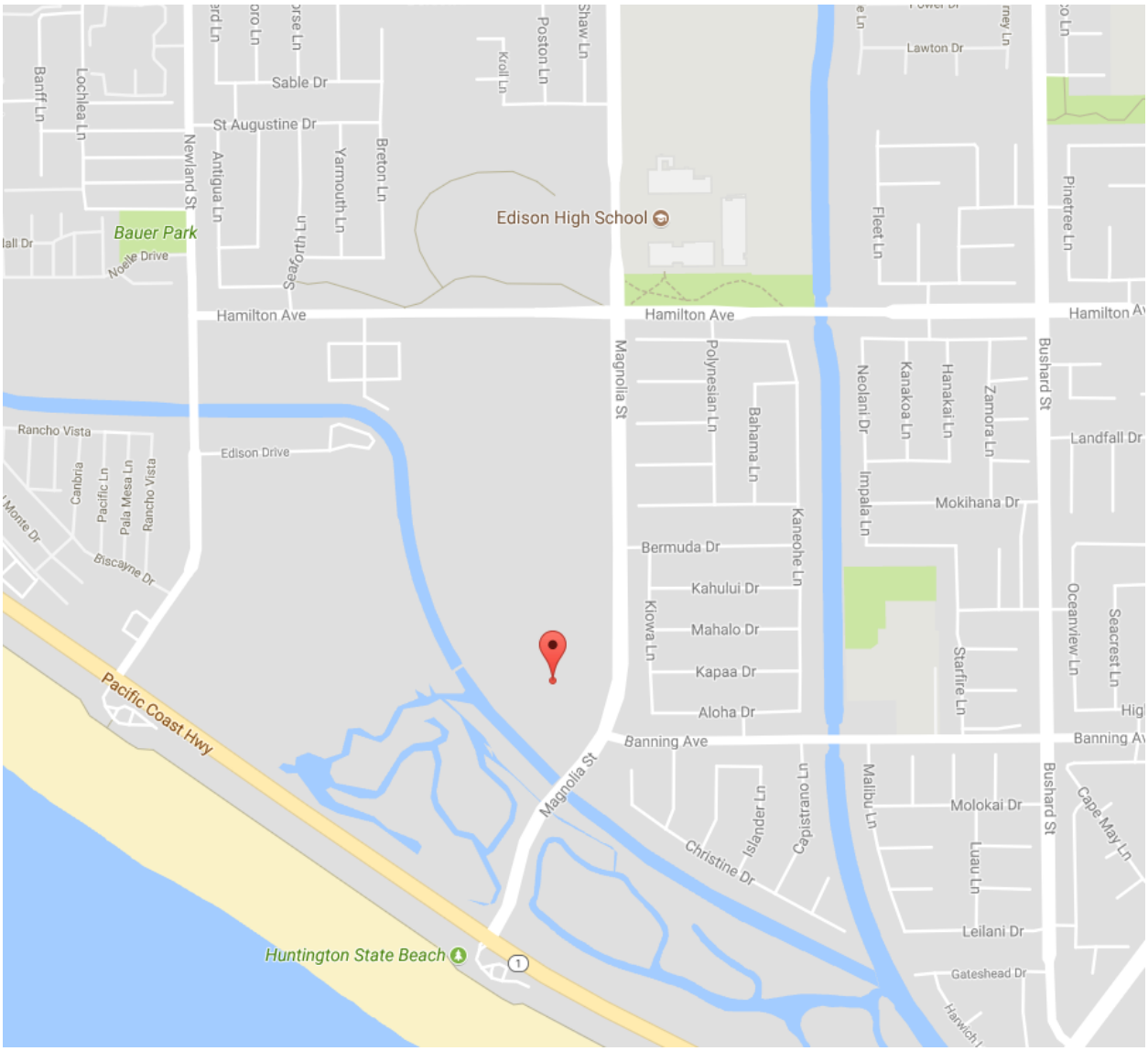
EXHIBITS

- Vicinity Map
- Preliminary WQMP Exhibit
- Existing and Proposed Hydrology Exhibits
- Typical Cross Sections

BMP DETAILS & FACT SHEETS

- Greywater Treatment System Details
- StormTrap Details
- Modular Wetland System Details
- Nutrient Separating Baffle Box Details

VICINITY MAP



MAGNOLIA MARSH
(N.A.P)

HUNTINGTON BEACH CHANNEL

DMA 9
2.20AC

DMA 1
1.11AC

DMA 10
0.41AC

DMA 3
5.33AC

DMA 6
3.63AC

DMA 2
12.77AC

DMA 11
0.36AC

DMA 7
0.15AC

DMA 8
0.13AC

DMA 12
2.02AC

DMA 13
0.16

DMA 4
0.09AC

DMA 5
0.09AC

SD

BANNING AVE

MAGNOLIA STREET

LEGEND

- PROPERTY LINE
- PROPOSED STORM DRAIN
- BMP DRAINAGE AREA BOUNDARY
- RESIDENTIAL ZONING
- LODGE/VISITOR-SERVING COMMERCIAL ZONING
- OPEN SPACE - PARKS AND RECREATION SUBDISTRICT ZONING
- COASTAL CONSERVATION ZONING
- STREET SWEEPING PRIVATE STREETS & PARKING LOTS
- CATCH BASIN WITH CONNECTOR PIPE SCREEN
- PROPOSED 8' DIA. CISTERN
- PROPOSED BIORETENTION SWALE WITH UNDERDRAIN
- PROPOSED MWS-L-4-28
- PROPOSED NUTRIENT SEPARATING BAFFLE BOX
- DIRECTION OF FLOW

160' 0' 80' 160'

SCALE: 1" = 160'

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Irvine, California 92606
tel 949.474.1960 • fax 949.474.5315
www.fuscoe.com

Exhibit Date: 12/20/2017

WATER QUALITY MANAGEMENT PLAN
MAGNOLIA TANK FARMS
HUNTINGTON BEACH, CA

SITE CHARACTERISTICS

AREA A	
TOTAL AREA	24.08 ACRES
PERVIOUS AREA	14.45 ACRES
IMPERVIOUS AREA	9.63 ACRES
PERCENT PERVIOUS	60.01%

AREA B	
TOTAL AREA	4.91 ACRES
PERVIOUS AREA	4.87 ACRES
IMPERVIOUS AREA	0.04 ACRES
PERCENT PERVIOUS	99.19%

AREA C	
TOTAL AREA	0.74 ACRES
PERVIOUS AREA	0.74 ACRES
IMPERVIOUS AREA	0.00 ACRES
PERCENT PERVIOUS	100.00%

SITE = INDUSTRIAL
SOIL CLASS = C

LEGEND

MAJOR BOUNDARY
MINOR BOUNDARY
FLOW PATH
EXISTING STORM DRAIN
A 1.75AC DRAINAGE AREA DESIGNATION
ACRES

SCALE: 1" = 40'

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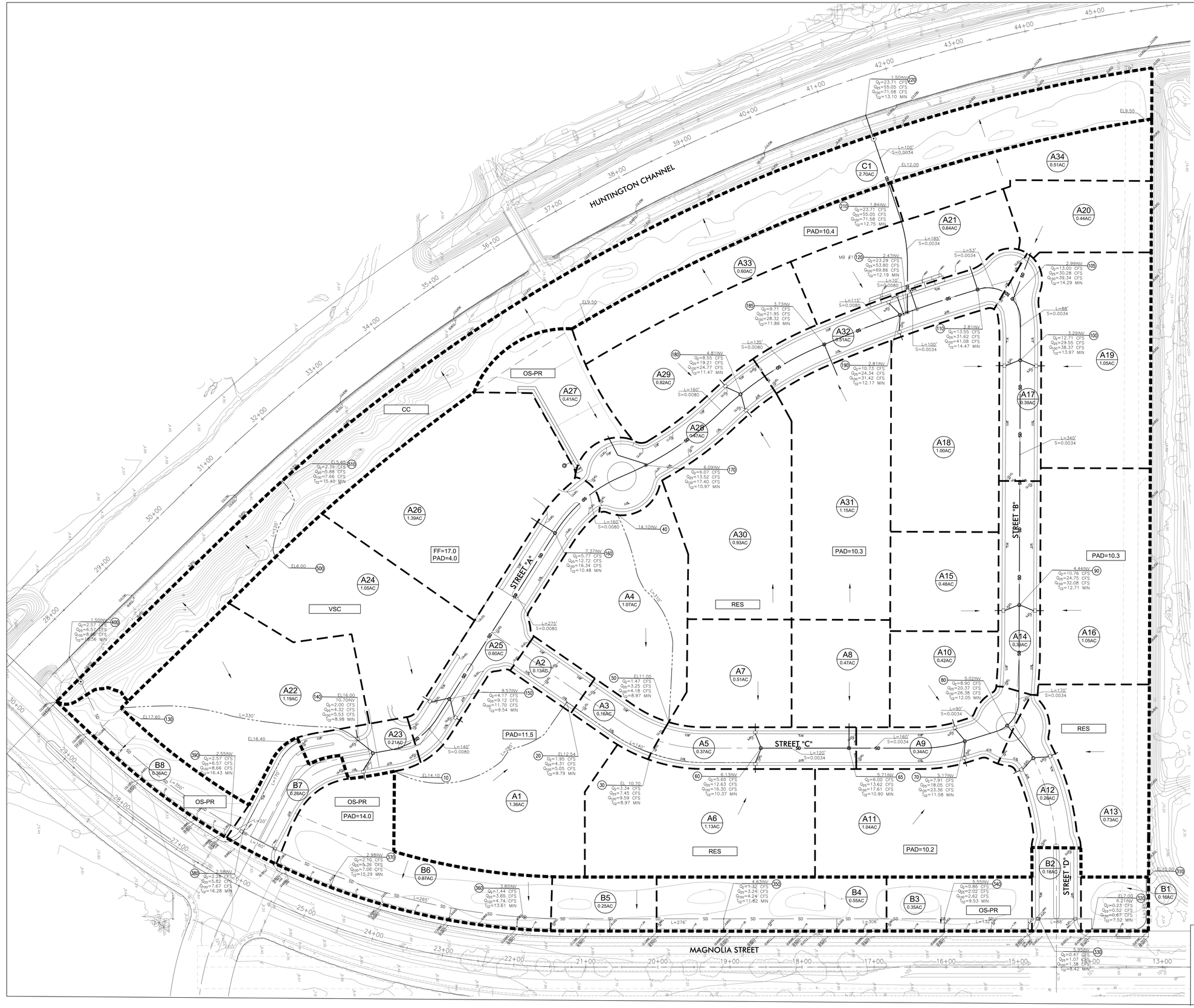
tel 949.474.1960 ◦ fax 949.474.5315 ◦ www.fuscoe.com

MAGNOLIA TANK FARMS
EXISTING HYDROLOGY
HUNTINGTON BEACH,CA
SEPTEMBER 2017



SITE = RESIDENTIAL/COMMERCIAL
SOIL CLASS = C

LEGEND

- MAJOR BOUNDARY
- MINOR BOUNDARY
- FLOW PATH
- LAND USE BOUNDARY
- PAD SUB-BOUNDARY
- SD EXISTING STORM DRAIN
- A / 1.75AC — DRAINAGE AREA DESIGNATION / ACRES
- S — SPLITTER BOX FOR LOW FLOW
- P — PUMP

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MAGNOLIA TANK FARM
PROPOSED HYDROLOGY

HUNTINGTON BEACH, CA

JANUARY 16, 2018

MODULAR WETLAND SYSTEM DESIGN SUMMARY

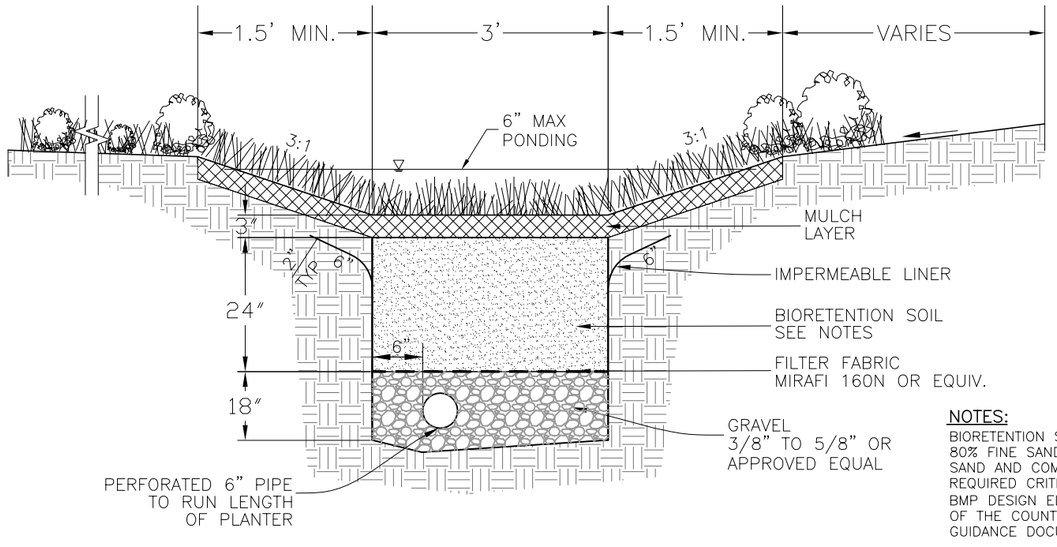
DMA	DRAINAGE AREA	IMPERVIOUSNESS	Q DESIGN	SIZE / MODEL	TOTAL UNITS	COMBINED TREATMENT CAPACITY	GPS COORDINATES
DMA 2	12.81 AC	65%	1.798 CFS	MWS-L-8-24	3	2.079 CFS	33.646102, -117.973977
DMA 3	5.33 AC	65%	0.748 CFS	MWS-L-8-16	2	0.924 CFS	33.645965, -117.973970
DMA 4	0.09 AC	98%	0.019 CFS	MWS-L-4-4	1	0.052 CFS	33.646461, -117.971095
DMA 5	0.09 AC	98%	0.019 CFS	MWS-L-4-4	1	0.052 CFS	33.646568, -117.971109
DMA 7	0.15 AC	98%	0.028 CFS	MWS-L-4-4	1	0.052 CFS	33.643425, -117.971487
DMA 8	0.13 AC	98%	0.024 CFS	MWS-L-4-4	1	0.052 CFS	33.643619, -117.971377

BIORETENTION SWALE SUMMARY

DMA	DRAINAGE AREA	IMPERVIOUSNESS	BMP PONDING DEPTH	80% DRAINAGE CAPACITY VOLUME	BMP LENGTH	BMP CAPACITY PROVIDED	GPS COORDINATES
DMA 1	1.11 AC	65%	6 IN	486 CU FT	400 FT	600 CUFT	33.646021, -117.974445

UNDERGROUND GALLERY FOR HARVERST & REUSE

DMA	DRAINAGE AREA	IMPERVIOUS-NESS	DCV	DCV REQUIRED TO MEET 80% CAPTURE EFFICIENCY	GALLERY DEPTH	GALLERY FOOTPRINT	TOTAL GALLERY CAPACITY	GPS COORDINATES
DMA 6	3.63 AC	90%	7,547 CUFT	9,056 CUFT	8 FT	1,160 SF	9,280 CUFT	33.644943, -117.973126



NOTES:

BIORETENTION SOIL SHALL CONSIST OF 60 TO 80% FINE SAND AND 20 TO 40% COMPOST. SAND AND COMPOST SHALL MEET THE REQUIRED CRITERIA PER THE MISCELLANEOUS BMP DESIGN ELEMENT FACT SHEETS (MISC-1) OF THE COUNTYWIDE WQMP TECHNICAL GUIDANCE DOCUMENT APPENDICES.

TYPICAL BIORETENTION SWALE

NOT TO SCALE

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www.fuscoe.com

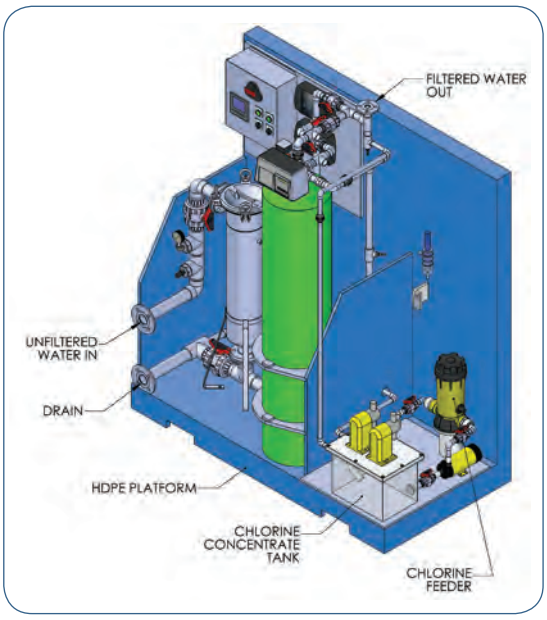
Not-to-Scale

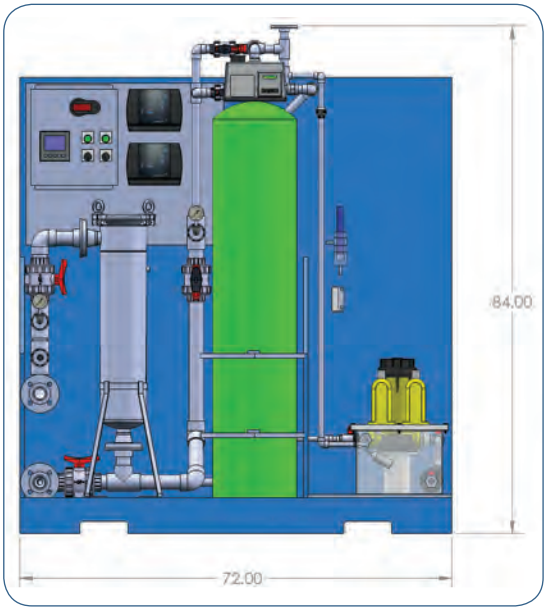
Exhibit Date: 09/29/2017

TYPICAL CROSS SECTIONS
MAGNOLIA TANK FARMS
HUNTINGTON BEACH, CA

wahaso™
WATER HARVESTING SOLUTIONS

GREYWATER PROCESSING





Custom Greywater Processing Systems from Wahaso

Greywater captured from showers, sinks and light commercial processes can be safely reused (harvested) for non-potable applications like toilet flushing and irrigation. But the contaminants and biological activity inherent in greywater require specialized filtration and sanitation steps to ensure the acceptability and safety of the treated water.

Wahaso engineers systems for commercial properties that are tailored to the specialized requirements for greywater harvesting.

System Features

Minimum holding time for untreated greywater. Raw greywater is treated as it is generated to minimize the growth of harmful pathogens.

Automated Sanitation System. Wahaso's proprietary chlorination system generates liquid chlorine from safe-to-handle dry calcium hypochlorite tablets. Residual chlorine levels are monitored and maintained automatically.

Multi-Stage Filtration System. Wahaso's two-stage filtration system is designed to efficiently remove contaminants in the greywater while minimizing system maintenance. Stage 1 removes larger particulates like hair and dirt while Stage 2 polishes the water for clarity, effectively removing all particulates greater than 10 microns in size.

Automated Controls and Reporting. Wahaso's proprietary control system monitors and tracks system activity and reports data and alarms locally and to Building Automation Systems through BACNET or MODBUS.

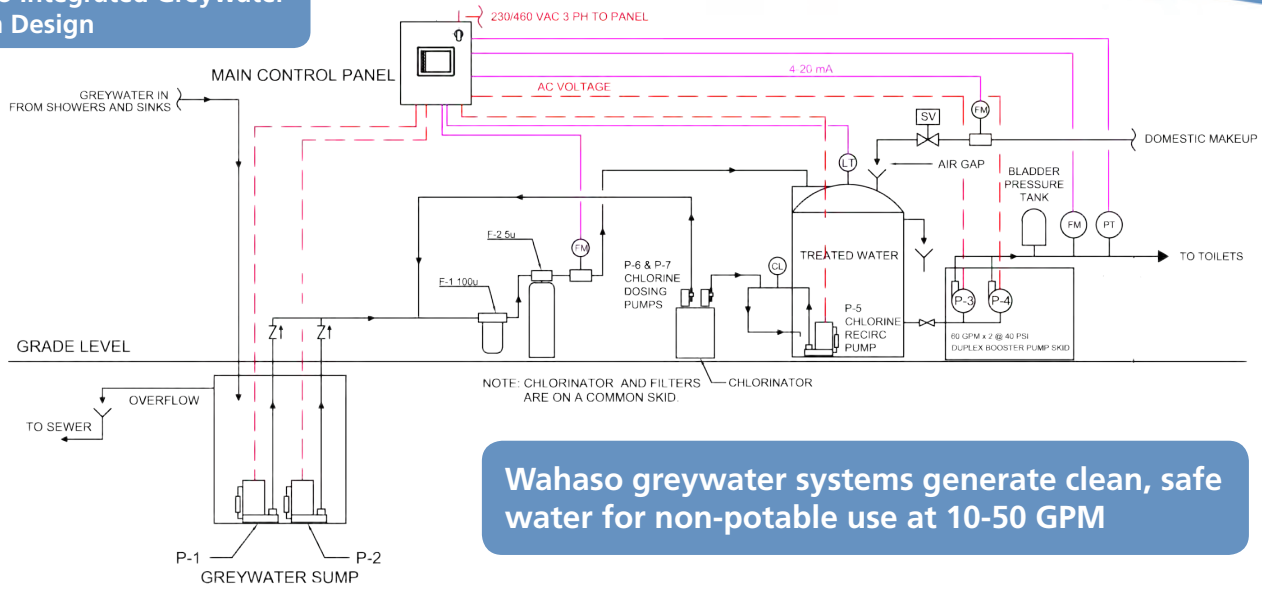
Integrated System Design. Wahaso's greywater processing skids are integrated into comprehensive system designs that include all pumps, storage, filtration and controls. Systems are pre-built on skids, tested and then delivered ready for installation.

Support and Warranty. Wahaso's systems include support from our engineering team before, during and after installation. A limited warranty covers the entire system for a year.

304 South Lincoln Street | Hinsdale, IL 60521 | **P** 800.580.5350 | **E** info@wahaso.com

wahaso™
WATER HARVESTING SOLUTIONS

Wahaso Integrated Greywater System Design



Wahaso greywater systems generate clean, safe water for non-potable use at 10-50 GPM

Wahaso GW Series Greywater Processing Systems use two stage filtration and two stage sanitation to provide safe and consistent on-site treated non-potable water for reuse in toilet flushing, irrigation and other applications.

Integrated with Wahaso's Series 100 proprietary control system, the entire process is fully automated with remote monitoring and alarm capability standard.

SPECIFICATIONS							Processing Skid Dimensions (Inches)		
Model#	Processing Capacity (GPM)	Gallons Per Day*	Inlet PSI	Outlet Filtration (Microns)	Inlet Size (From Sump) Inches	Outlet Size (To Tank) Inches	Length	Width	Height
GW-600	10	7,200	35	10	2	1	72	36	84
GW-1200	20	14,400	35	10	2	1.5	72	36	84
GW-1800	30	21,600	35	10	2	1.5	96	36	96
GW-3000	50	36,000	35	10	2	2	96	36	96

*Effective daily capacity based on 12-hours of building use.

Technical Notes:
Sequence:

Raw Greywater is pumped to the processing skid at 35 PSI.

In the first sanitation stage, chlorine is injected into the stream before filtration.

Stage 1 filtration removes debris larger than 100 microns.

Stage 2 filtration uses a multimedia bed to polish water to 10 microns or less. Second stage filtration is self-cleaning.

Discharge water exceeds NSF standards for maximum levels of 2.2 MPN/100 ml mean average coliform

Treated water is deposited in a holding tank for staging before use.

In the second sanitation stage, chlorine levels in the holding tank are monitored and adjusted to maintain residual levels within a pre-set range to ensure the safety of the treated water.

Controls:
Wahaso Series 100 Control System monitors and data logs incoming flow rate, volume, and pressure. Out of tolerance parameters prompt alarms and alerts.

Automatic injection of first stage sanitation is based on flow volume to greywater processing skid.

System Differential Pressure monitored for First Stage Filter and alarm and alerts issued when service is required.

Second stage filter is self-monitoring and self-cleaning. Automatic back flush occurs on differential pressure or every 10 days to automatically keep filter in proper operating condition.

Chlorine residual for second stage sanitation is automatically maintained by user selectable rate between 0.5 and 2 PPM.

For safety, system automatically reverts to municipal water source in low-level condition or with the occurrence of a critical alarm or system fault.

Volume of water processed, hours run, chlorine residual, and other key parameters are automatically data logged and communication with Building Automation Systems through BACNET or MODBUS is standard.

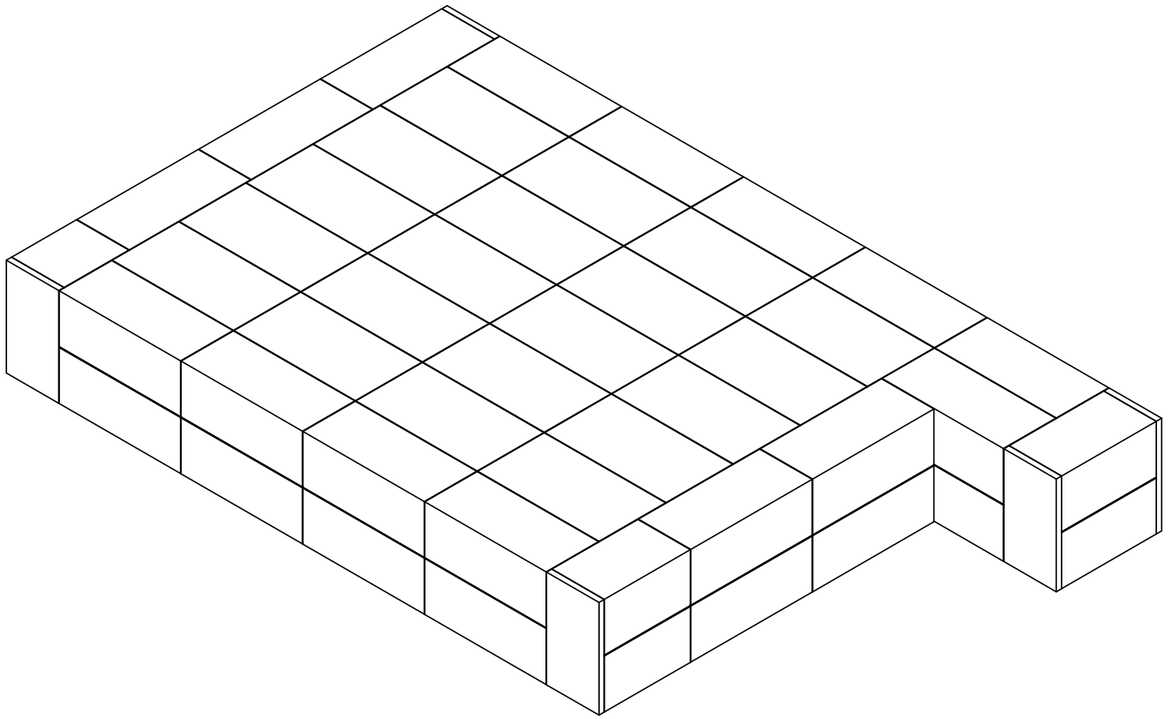
Wahaso.com

304 South Lincoln Street | Hinsdale, IL 60521 | **P** 800.580.5350 | **E** info@wahaso.com

STORMTRAP®

PATENTED

PRECAST CONCRETE MODULAR STORMWATER MANAGEMENT SYSTEM



STORMTRAP USA - DOUBLETRAP

ANYWHERE, USA

STORMTRAP

PRECAST CONCRETE MODULAR STORMWATER MANAGEMENT SYSTEMS
THIS STORMTRAP DESIGN MAY BE COVERED BY 1 OR MORE OF THE FOLLOWING U.S. PATENTS: NO. 6,991,402 B2, 7,160,058 B2, 7,344,335 B2 C.A. PATENT NO. 2,45,609

2495 WEST BUNGALOW ROAD
MORRIS, IL 60450
P: 815-941-4663
F: 815-416-1100

ENGINEERS USA

ANYWHERE, USA
Phone:
Fax:

STORMTRAP USA - DOUBLETRAP

ANYWHERE, USA

DESIGN ASSUMPTIONS

COVER:	MIN: 1.08' - MAX: 6.00'
GROUNDWATER TABLE:	BELOW THE SYSTEMS INVERT
SOIL PRESSURE:	3000 PSF
LOADING:	AASHTO HS-20 HIGHWAY LOADING

SHEET INDEX

JOB SITE INFORMATION

DESCRIPTION

JOB NAME:	STORMTRAP USA - DOUBLETRAP
ENGINEERING COMPANY:	ENGINEERS USA
CONTACT NAME:	
CONTACT PHONE:	
CONTACT FAX:	
STORM TRAP SUPPLIER:	STORMTRAP
CONTACT NAME:	~
CONTACT PHONE:	~
CONTACT EMAIL:	~
WATER STORAGE REQ'D:	43,560.00 CUBIC FEET
WATER STORAGE PROV:	45,216.95 CUBIC FEET
UNIT HEADROOM:	11'-4" DOUBLETRAP
UNIT QUANTITY:	76 TOTAL PIECES

DATE:

05-AUG-2013

APPROVED BY:

ISSUED FOR:

PRELMINARY

REV.:	DATE:	DESC.	DWG.
1	05-AUG-2013	ISSUED FOR PRELIMINARY	~

SCALE:

NTS

SHEET TITLE:

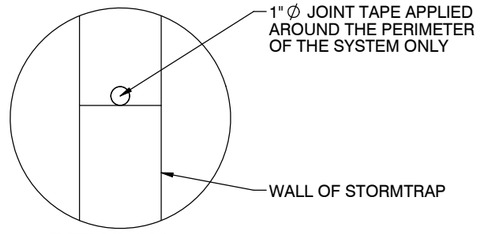
COVER SHEET

SHEET NUMBER:

0.0

STORMTRAP INSTALLATION SPECIFICATION

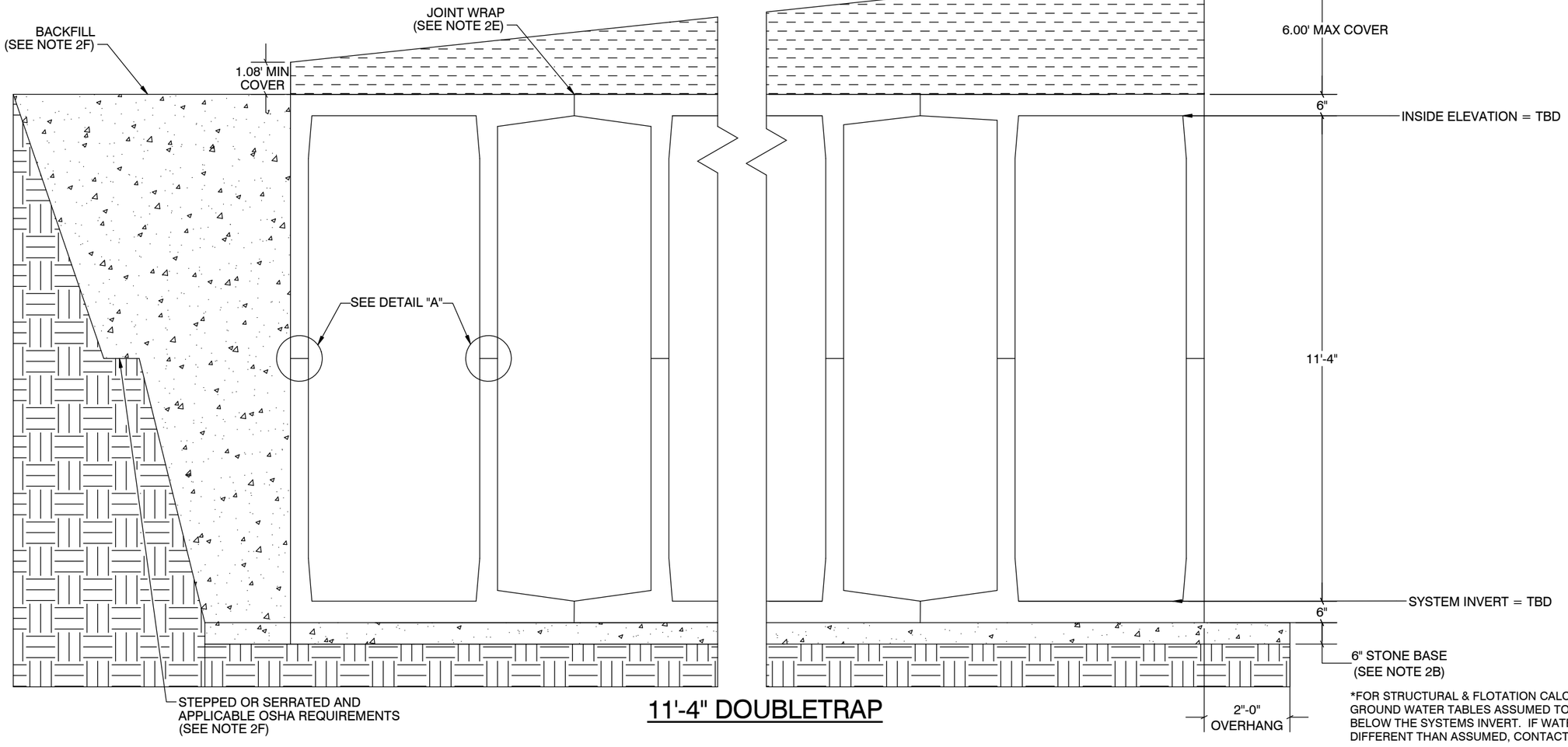
1. STORMTRAP MODULES SHALL BE MANUFACTURED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR AND ENGINEER. THE SHOP DRAWINGS SHALL INDICATE SIZE AND LOCATION OF ROOF OPENINGS AND INLET/ OUTLET PIPE OPENINGS.
2. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891-09, STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRE-CAST CONCRETE UTILITY STRUCTURES. THE FOLLOWING ADDITIONS AND/OR EXCEPTIONS SHALL APPLY:
   - A. SPECIFICATIONS ON THE ENGINEER'S DRAWINGS SHALL TAKE PRECEDENCE.
   - B. STORMTRAP MODULES SHALL BE PLACED ON A LEVEL PAD OF 3/4" AGGREGATE, THAT EXTENDS 2'-0" PAST THE OUTSIDE OF THE SYSTEM, PER ASTM C891-09 STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES.
   - C. THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED 3/4". IF THE SPACE EXCEEDS 3/4", THE MODULES SHALL BE RESET WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.
   - D. THE PERIMETER HORIZONTAL JOINT OF THE STORMTRAP MODULES SHALL BE SEALED TO THE FOOTINGS WITH PREFORMED MASTIC JOINT SEALER ACCORDING TO ASTM C891-09, 8.8 AND 8.12.
   - E. ALL EXTERIOR AND INTERIOR JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH PRE-FORMED, COLD-APPLIED, SELF-ADHERING ELASTOMERIC RESIN BONDED TO A WOVEN HIGHLY PUNCTURE RESISTANT POLYMER WRAP CONFORMING TO ASTM C891-09 AND SHALL BE 0'-8" INTEGRATED PRIMER SEALANT AS APPROVED BY STORMTRAP. THE ADHESIVE EXTERIOR JOINT WRAP SHALL BE INSTALLED ACCORDING TO THE FOLLOWING INSTALLATION INSTRUCTIONS:
     1. USE A BRUSH OR WET CLOTH TO THOROUGHLY CLEAN THE OUTSIDE SURFACE AT THE POINT WHERE THE JOINT WRAP IS TO BE APPLIED.
     2. A RELEASE PAPER PROTECTS THE ADHESIVE SIDE OF THE JOINT WRAP. PLACE THE ADHESIVE TAPE (BUTYL SIDE DOWN) AROUND THE STRUCTURE, REMOVING THE RELEASE PAPER AS YOU GO. PRESS THE JOINT WRAP FIRMLY AGAINST THE STORMTRAP MODULE SURFACE WHEN APPLYING.
   - F. THE FILL PLACED AROUND THE STORMTRAP UNITS MUST BE DEPOSITED ON BOTH SIDES AT THE SAME TIME AND TO APPROXIMATELY THE SAME ELEVATION. AT NO TIME SHALL THE FILL BEHIND ONE SIDE WALL BE MORE THAN 2'-0" HIGHER THAN THE FILL ON THE OPPOSITE SIDE. BACKFILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY OR OTHERWISE SPECIFIED BY ENGINEER. CARE SHALL BE TAKEN TO PREVENT ANY WEDGING ACTION AGAINST THE STRUCTURE, AND ALL SLOPES BOUNDING OR WITHIN THE AREA TO BE BACKFILLED MUST BE STEPPED OR SERRATED TO PREVENT WEDGE ACTION. (REFERENCE ARTICLE 502.10 I.D.O.T. S.S.R.B.C.) CARE SHALL ALSO BE TAKEN AS NOT TO DISRUPT THE JOINT WRAP FROM THE JOINT DURING THE BACKFILL PROCESS. BACKFILL MATERIAL TO CONSIST OF 1/4" TO 3/4" WASHED COARSE AGGREGATE STONE OR APPROVED EQUAL.



DETAIL "A"
JOINT TAPE INSTALLATION

STORMTRAP SPECIFICATION

1. TOTAL COVER: MIN. 1.08' MAX. 6.00' CONSULT STORMTRAP FOR ADDITIONAL COVER OPTIONS.
2. CONCRETE CHAMBER DESIGNED FOR AASHTO HS-20 HIGHWAY LOADING. MIN. SOIL PRESSURE 3000 PSF.
3. ALL DIMENSIONS AND SOIL CONDITIONS, INCLUDING BUT NOT LIMITED TO GROUNDWATER AND SOIL BEARING CAPACITY ARE TO BE VERIFIED IN THE FIELD BY OTHERS PRIOR TO STORMTRAP INSTALLATION.
4. FOR STRUCTURAL AND FLOTATION CALCULATIONS THE GROUND WATER TABLE IS ASSUMED TO BE BELOW THE SYSTEMS INVERT. IF WATER TABLE IS DIFFERENT THAN ASSUMED, CONTACT STORMTRAP.
5. FOR STRUCTURAL CALCULATIONS THE SOIL DENSITY IS ASSUMED TO BE 120 PCF.
6. FOR FLOTATION CALCULATIONS THE GROUND WATER TABLE IS ASSUMED TO BE BELOW THE SYSTEMS INVERT. IF WATER TABLE IS DIFFERENT THAN ASSUMED, CONTACT STORMTRAP.
7. STORMTRAP IS NOT WATERTIGHT. CONTACT STORMTRAP FOR WATERTIGHT OPTIONS. WATERTIGHT APPLICATION TO BE PROVIDED BY OTHERS.



11'-4" DOUBLETRAP

*FOR STRUCTURAL & FLOTATION CALCULATIONS THE GROUND WATER TABLES ASSUMED TO BE BELOW THE SYSTEMS INVERT. IF WATER TABLE IS DIFFERENT THAN ASSUMED, CONTACT STORMTRAP.

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2495 WEST BUNGALOW ROAD
MORRIS, IL 60450
P: 815-941-4663
F: 815-416-1100

ENGINEERS USA

ANYWHERE, USA
Phone:
Fax:

STORMTRAP USA - DOUBLETRAP

ANYWHERE, USA

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05-AUG-2013

APPROVED BY:

ISSUED FOR:
PRELMINARY

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NTS

SHEET TITLE:
DOUBLETRAP INSTALLATION SPECIFICATIONS

SHEET NUMBER:
1.0

RECOMMENDED
ACCESS OPENING SPECIFICATION

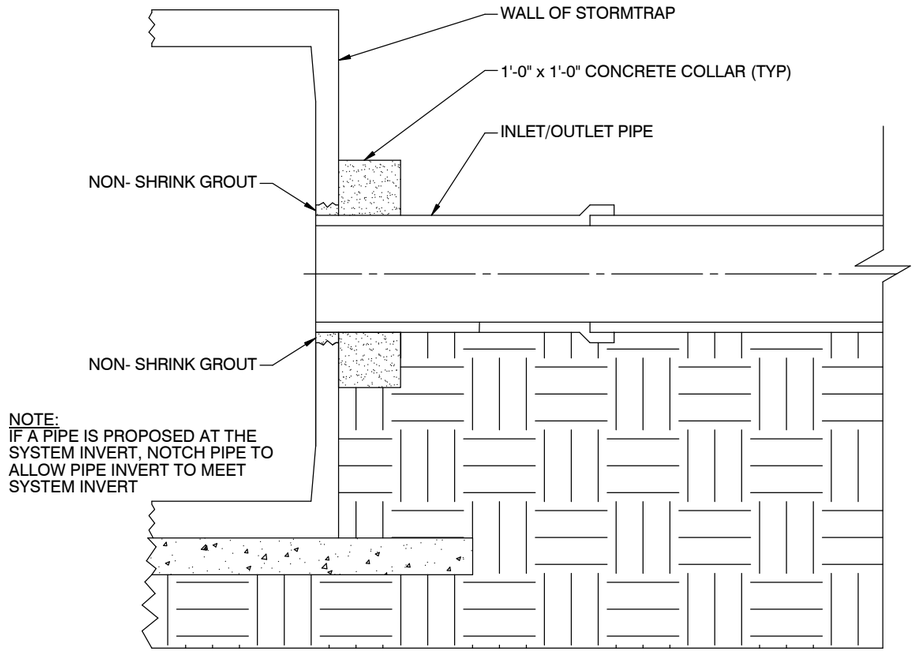
1. A TYPICAL ACCESS OPENING FOR THE STORMTRAP SYSTEM RANGES FROM 2'-0" TO 3'-0" IN DIAMETER. ACCESS OPENINGS LARGER THAN 3'-0" IN DIAMETER NEED TO BE APPROVED BY STORMTRAP.
2. PLASTIC COATED STEEL STEPS PRODUCED BY M.A. INDUSTRIES PART #PS3-PFC (SEE DETAIL TO THE RIGHT) ARE PROVIDED INSIDE ANY UNIT WHERE DEEMED NECESSARY. THE HIGHEST STEP IN THE UNIT IS TO BE PLACED A DISTANCE OF 1'-0" FROM THE INSIDE EDGE OF THE STORMTRAP UNITS. ALL ENSUING STEPS SHALL BE PLACED WITH A MAXIMUM DISTANCE OF 1'-4" BETWEEN THEM. STEPS MAY BE MOVED OR ALTERED TO AVOID OPENINGS OR OTHER IRREGULARITIES IN THE UNIT.
3. STORMTRAP LIFTING INSERTS MAY BE RELOCATED TO COINCIDE WITH THE ACCESS OPENING OR THE CENTER OF GRAVITY OF THE UNIT AS NEEDED.
4. STORMTRAP ACCESS OPENINGS MAY NOT INTERFERE WITH INLET AND/OR OUTLET OPENINGS.
5. ACCESS OPENINGS SHOULD BE LOCATED IN ORDER MEET THE APPROPRIATE MUNICIPAL REQUIREMENTS. STORMTRAP RECOMMENDS AT LEAST ONE ACCESS OPENING PER SYSTEM.
6. USE PRECAST ADJUSTING RINGS AS NEEDED TO MEET GRADE. STORMTRAP RECOMMENDS FOR COVER OVER 2' TO USE PRECAST BARREL OR CONE SECTIONS.

RECOMMENDED
PIPE OPENING SPECIFICATION

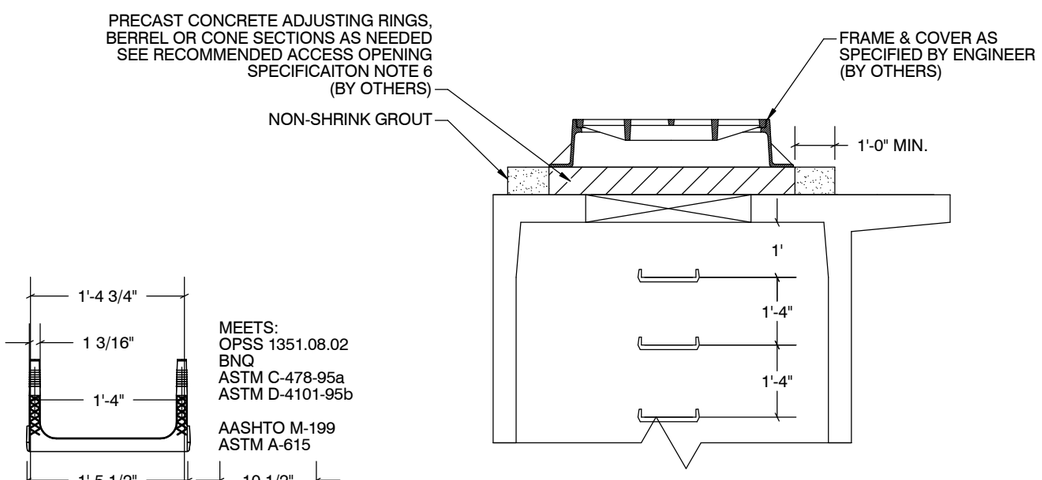
1. MINIMUM EDGE DISTANCE FOR AN OPENING ON THE OUTSIDE WALL SHALL BE NO LESS THAN 1'-0".
2. ALL OPENINGS MUST RETAIN AT LEAST 1'-0" OF CLEARANCE IN ALL DIRECTIONS FROM THE EDGE OF THE STORMTRAP UNITS.
3. OPENING SIZE SHALL NOT EXCEED ∅36" OR 1'-6" LESS THEN THE INSIDE HEIGHT OF THE UNIT. EXAMPLE: 3'-0" UNIT MAXIMUM OPENING = ∅1'-6".
4. OPENINGS ARE NOT LIMITED TO THE ABOVE PARAMETERS BUT ARE RECOMMENDED. ANY OPENING NEEDED THAT DOES NOT FIT THE CRITERIA SHALL BE BROUGHT TO THE ATTENTION OF STORMTRAP FOR REVIEW.
5. CONNECTING PIPES SHALL BE INSTALLED WITH A 1'-0" CONCRETE COLLAR, AND A CONCRETE CRADLE FOR AT LEAST ONE PIPE LENGTH, AS SHOWN. A STRUCTURAL GRADE CONCRETE OR GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI SHALL BE USED.
6. THE ANNULAR SPACE BETWEEN THE PIPE AND THE HOLE SHALL BE FILLED WITH NON-SHRINK GROUT.

RECOMMENDED
INSTALLATION INSTRUCTIONS

1. CLEAN AND LIGHTLY LUBRICATE ALL OF PIPE TO BE INSERTED INTO STORMTRAP.
2. IF PIPE IS CUT, CARE SHOULD BE TAKEN TO ALLOW NO SHARP EDGES. BEVEL AND LUBRICATE LEAD END OF PIPE.
3. ALIGN CENTER OF PIPE TO CORRECT ELEVATION AND INSERT INTO OPENING.



FOUNDATION
PIPE CONNECTION



RISER / STAIR DETAIL

STAIR DETAIL

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P: 815-941-4663
F: 815-416-1100

ENGINEERS USA

ANYWHERE, USA
Phone:
Fax:

STORMTRAP USA - DOUBLETRAP

ANYWHERE, USA

DATE:
05-AUG-2013

APPROVED BY:

ISSUED FOR:
PRELMINARY

REV.:	DATE:	DESC.	DWG.
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SCALE:
NTS

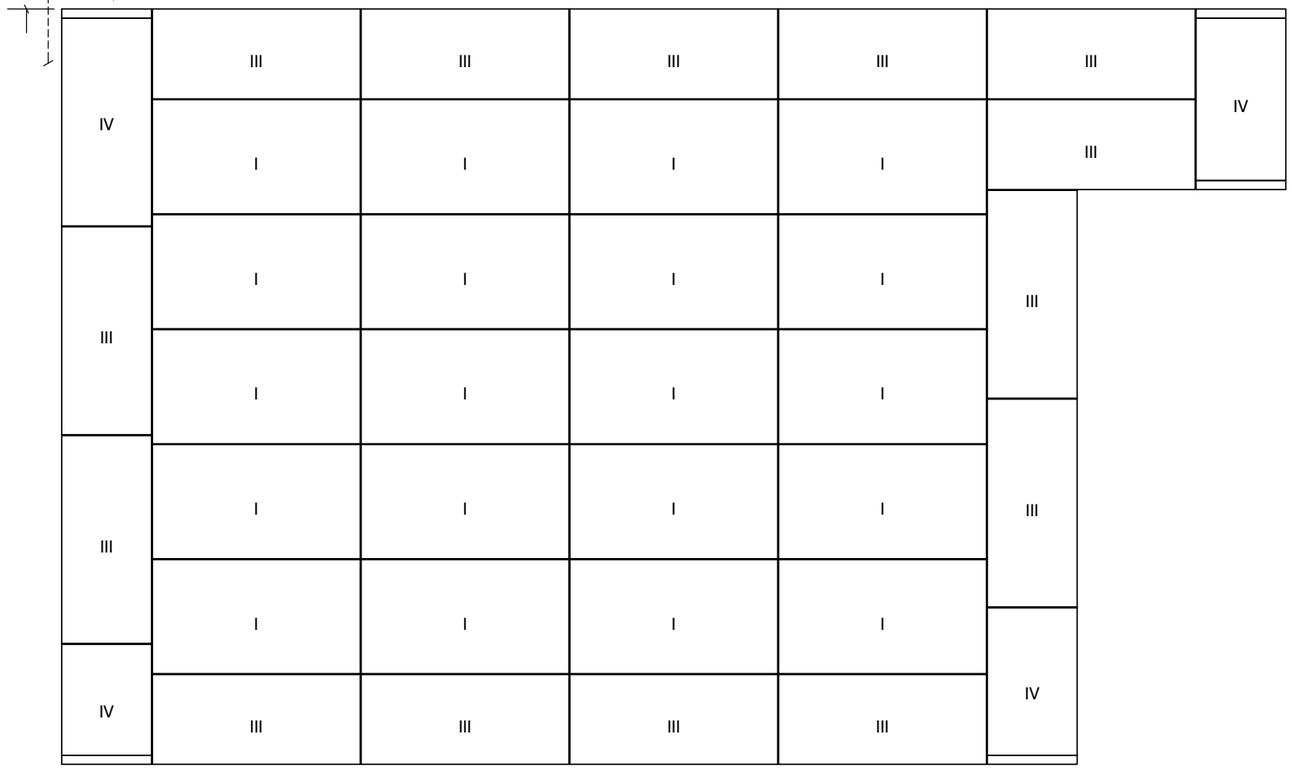
SHEET TITLE:
RECOMMENDED SINGLETRAP INSTALLATION SPECIFICATIONS

SHEET NUMBER:
2.0

BILL OF MATERIALS

QTY.	UNIT TYPE	DESCRIPTION	TOP WEIGHT	BASE WEIGHT
20	I	11'-4" DOUBLETRAP	15900	15660
0	II	11'-4" DOUBLETRAP	18825	18585
14	III	11'-4" DOUBLETRAP	16250	16130
0	IV	11'-4" DOUBLETRAP	17712	17592
0	VII	11'-4" DOUBLETRAP	16602	16602
3	SPIV	11'-4" DOUBLETRAP	VARIES	
5	PANEL	8" THICK WALL PANELS	8176#	
9	JOINTWRAP	150' PER ROLL		
23	JOINTTAPE	14.5' PER ROLL		

FOUNDATION DETAIL
SEE SHEET 1.0



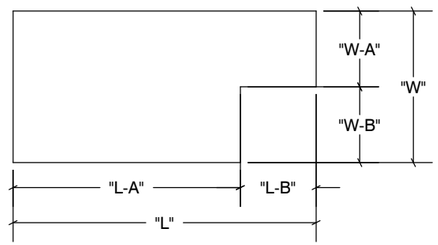
DESIGN CRITERIA
ALLOWABLE MAX GRADE = TBD
ALLOWABLE MIN GRADE = TBD
INSIDE HEIGHT ELEVATION = TBD
SYSTEM INVERT = TBD
STORMTRAP VOLUME = 45,216.95 C.F. / 1.04 A.F.

NOTES:
1. DIMENSION OF STORMTRAP SYSTEM ALLOW FOR A 3/4" GAP BETWEEN EACH UNIT.
2. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
3. SEE SHEET 2 FOR INSTALLATION SPECIFICATIONS.

LAYOUT DETAIL

SYSTEM DIMENSIONS

L= 90 FT - 3.5 IN
W = 55 FT - 8.5 IN
L-A = 74 FT - 10.75 IN
L-B = 15 FT - 4.75 IN
W-A = 13 FT - 3.75 IN
W-B = 42 FT - 4.75 IN



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STORMTRAP USA - DOUBLETRAP

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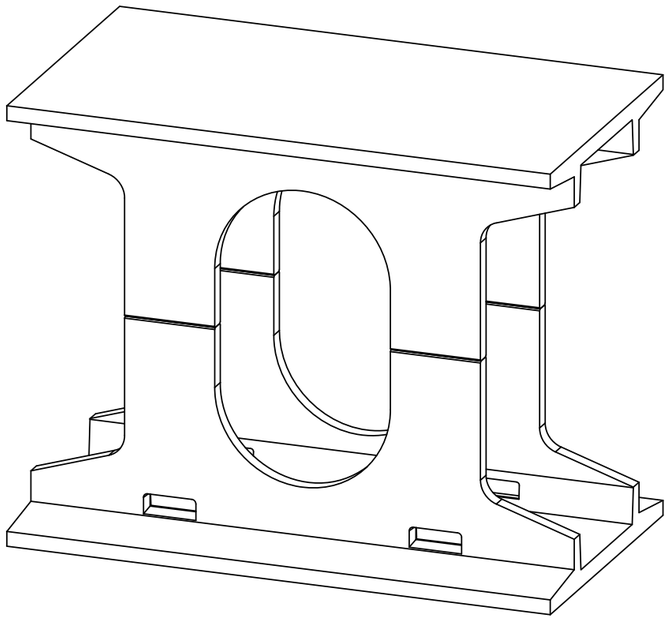
SCALE:
NTS

SHEET TITLE:
LAYOUT DETAIL

SHEET NUMBER:
3.0

TYPE I



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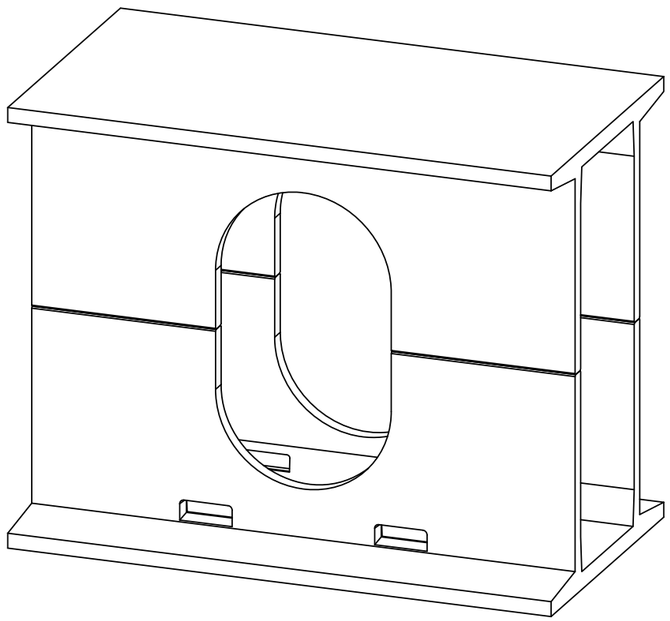

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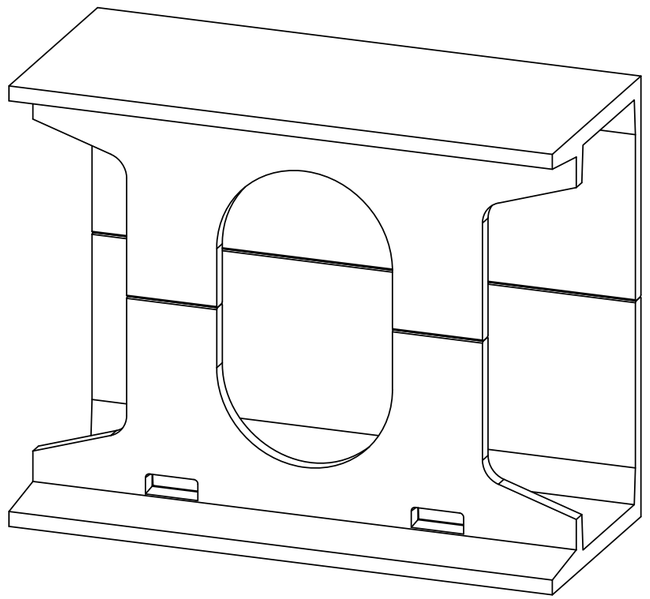
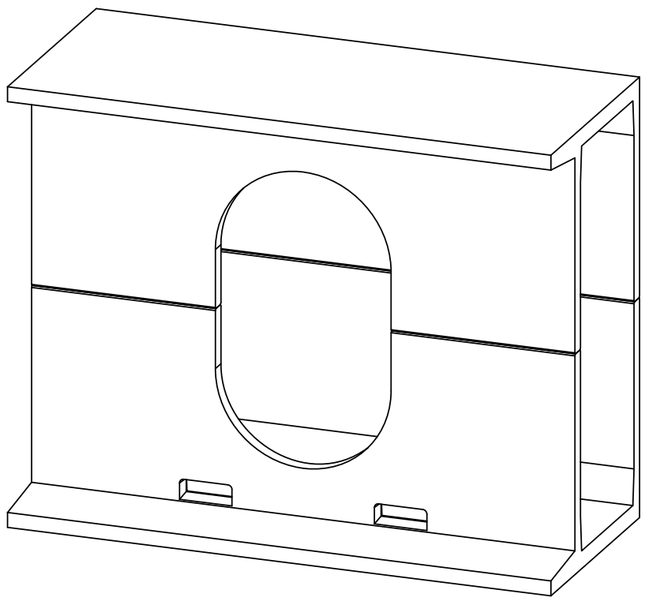
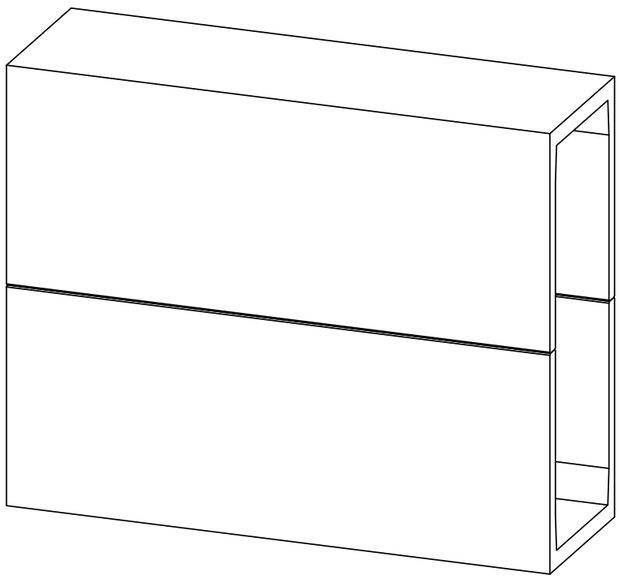


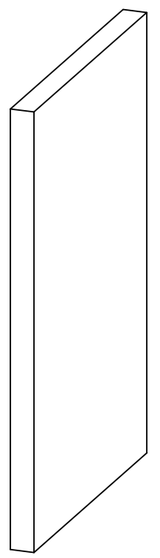
TYPE IV



TYPE VII



TYPE II PANEL



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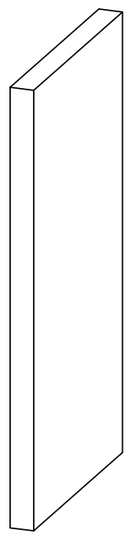
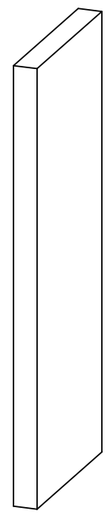


TYPE VII PANEL



NOTES:

1. OPENING LOCATIONS VARY ON UNIT HEIGHT AND LENGTHS.
2. SP - INDICATES A UNIT WITH MODIFICATIONS.
3. POCKET WINDOW OPENINGS ARE OPTIONAL

STORMTRAP

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1		ISSUED FOR PRELIMINARY	~

SCALE:

NTS

SHEET TITLE:

11'-4" DOUBLETRAP UNIT TYPES

SHEET NUMBER:

4.0

SITE SPECIFIC DATA*	
PROJECT NAME	
PROJECT LOCATION	
STRUCTURE ID	

PERFORMANCE DATA	
TREATMENT FLOW (CFS)	
TREATMENT HGL (FT)	3.4
BYPASS FLOW RATE (CFS)	

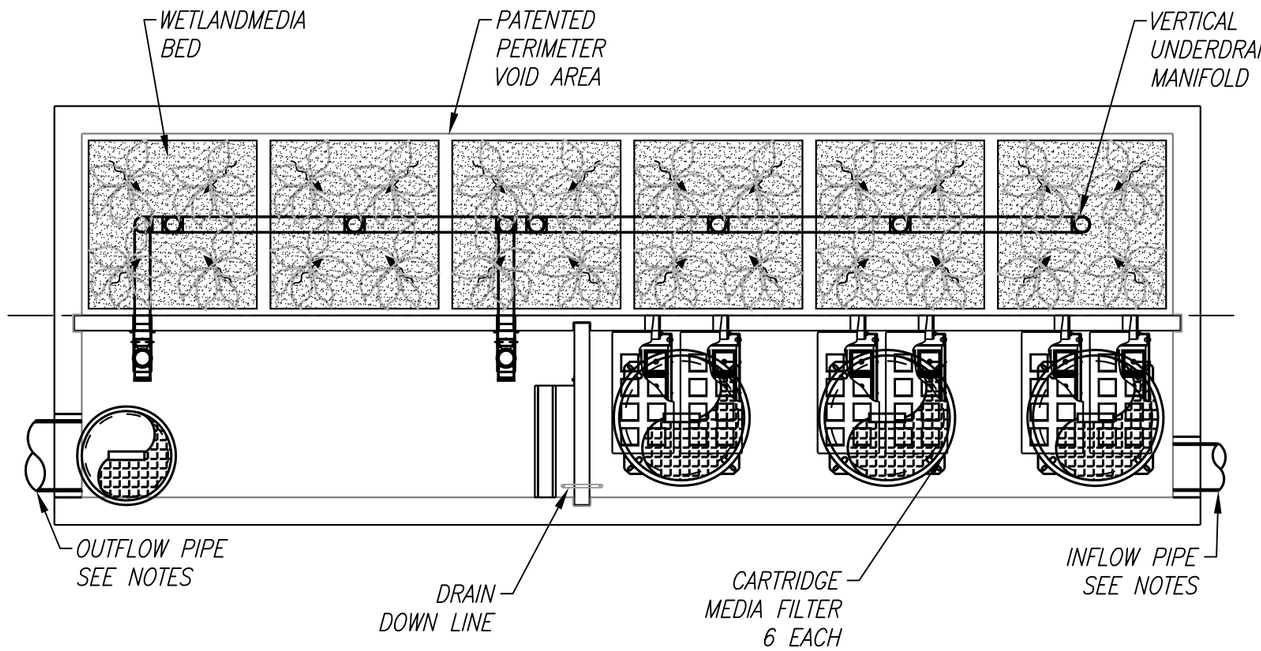
PROJECT PARAMETERS			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1		PVC	
OUTLET PIPE 1		PVC	
RIM ELEVATION			
SURFACE LOADING REQUIREMENT		PARKWAY	

FRAME & COVER	PRETREATMENT	BIOFILTRATION	DISCHARGE
	30"		24"

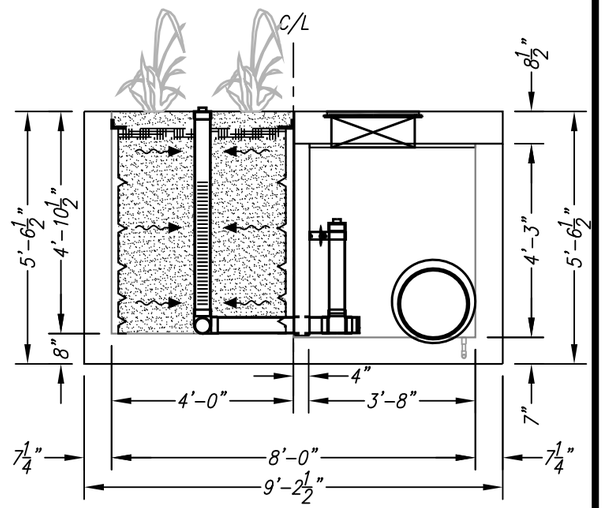
WETLANDMEDIA VOLUME (CY)	
MEDIA DELIVERED	
ORIFICE SIZE (DIA)	
MAX PICK WEIGHT (LBS)	

NOTES:

*PER ENGINEER OF RECORD



PLAN VIEW



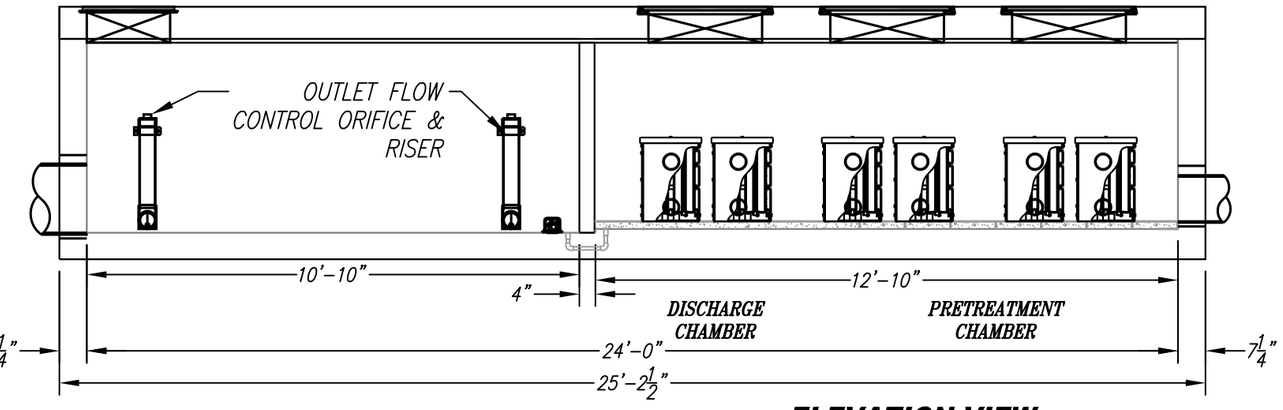
LEFT END VIEW

INSTALLATION NOTES

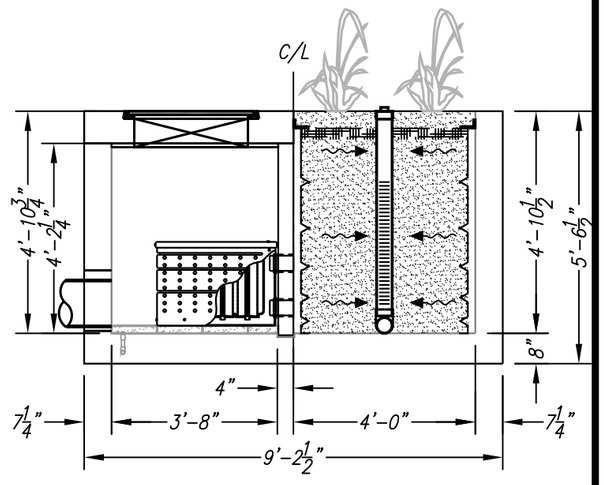
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. MANUFACTURER RECOMMENDS A MINIMUM 6"LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH).
4. INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR.
5. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
6. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.



ELEVATION VIEW



RIGHT END VIEW

MWS UNIT DESIGN DATA	
TREATMENT CAPACITY (CFS)	0.693
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND LOADING RATE (GPM/SF)	1.0

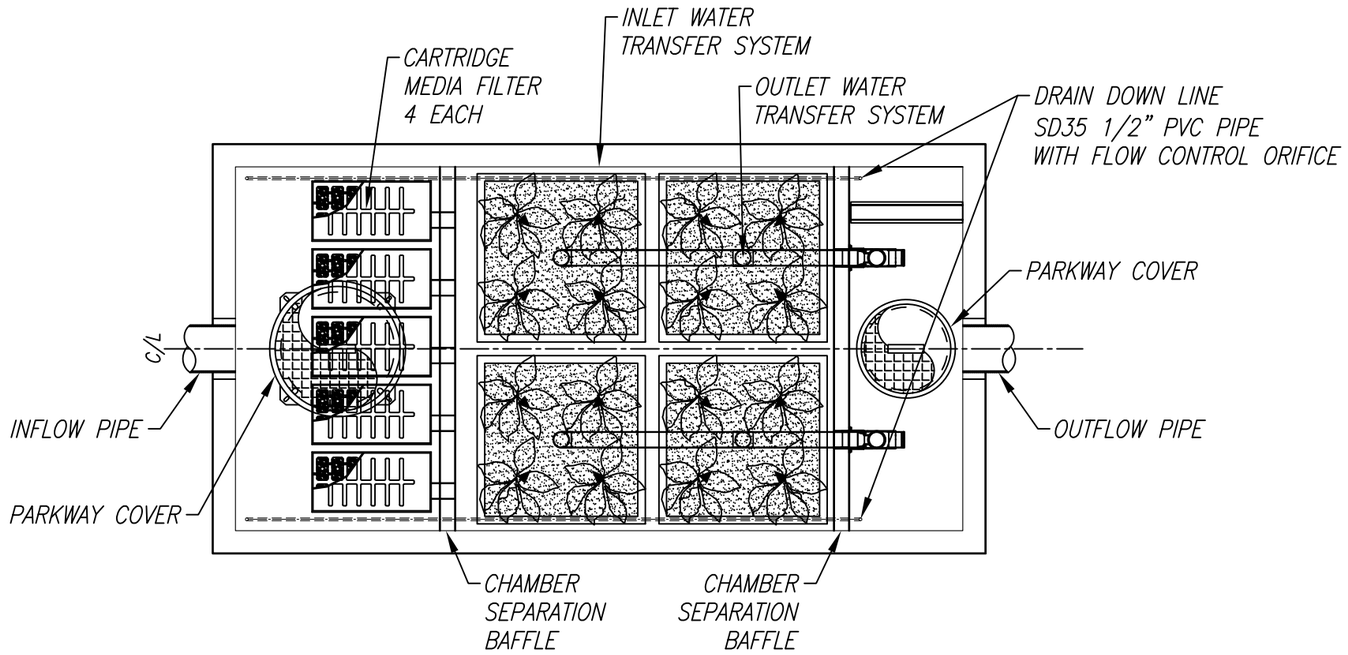
MODULAR WETLANDS

MWS-L-8-24-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

4/8/15/JUSTIN

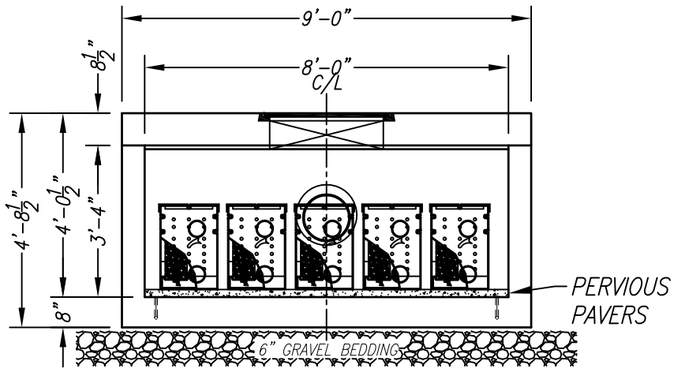
MODULAR WETLAND SYSTEMS LINEAR 2.0 VAULT TYPE

FLOW RATES
PEAK TREATMENT FLOW RATE = 0.462 CFS OR 207.31 GPM
PEAK BYPASS FLOW RATE = N/A
SPECIFICATIONS
INSTALL AT SURFACE
O.D. DIMENSIONS = 17' X 9' X 4.7'

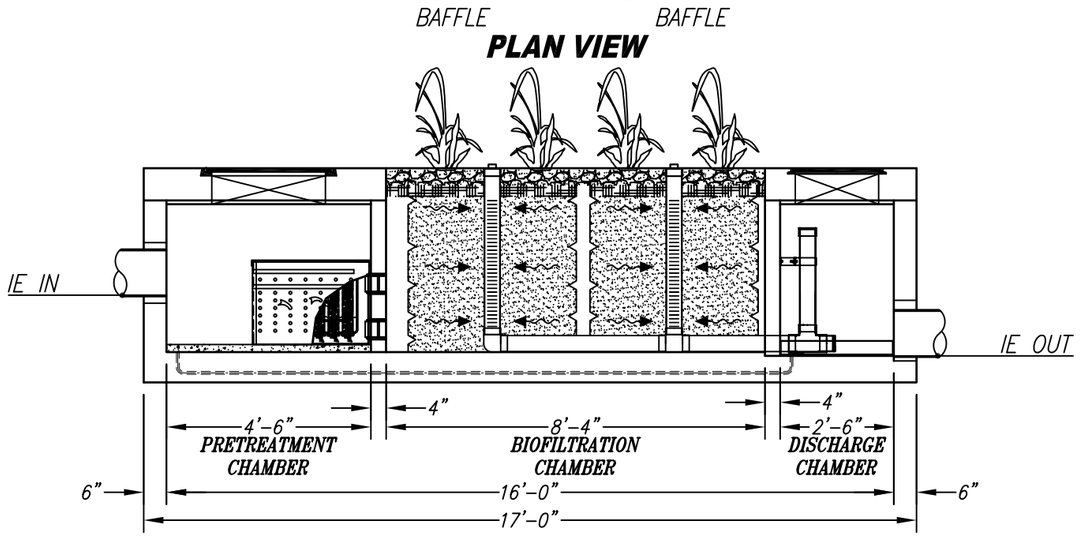


PLAN VIEW

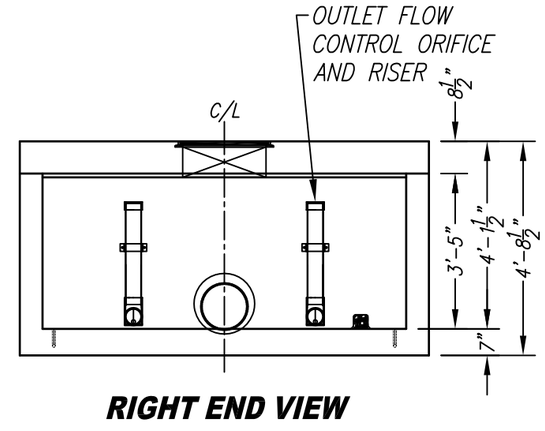
BIOFILTRATION CHAMBER SURFACE AREA CALCS
SIDES = 4
3.7' L x 3.4' H = 12.58 SF
12.58 SF X 4 SIDES = 50.32
CELLS = 4
50.32 X 4 CELLS = 201.28
TOTAL WETLAND MEDIA SURFACE AREA **= 201.28 SF**
WETLAND MEDIA LOADING RATE 207.31 GPM / 201.28 SF **= 1.03 GPM/SF**
PRETREATMENT FILTER SURFACE AREA CALCS
TOTAL PRETREATMENT SURFACE AREA 25 SF x 5 FILTERS **= 125.00 SF**
PRETREATMENT FILTER LOADING RATE 207.31 GPM / 125.00 SF **= 1.66 GPM/SF**



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

LEGEND

- WETLAND MEDIA
- PLANT/ROOT MOISTURE RETENTION LAYER
- MANHOLE / ACCESS HATCH

INSTALLATION NOTES:

1. INSTALL UNIT ON LEVEL BED OF GRAVEL OF AT LEAST 6" IN DEPTH WITH 1' MINIMUM OVER EXCAVATION AROUND ENTIRE UNIT.
2. CONCRETE 28 DAY COMPRESSIVE STRENGTH fc=5,000 PSI.
3. REINFORCING: ASTM A-615, GRADE 60.
4. RATED FOR PARKWAY LOADING 300 PSF.
5. JOINT SEALANT: BUTYL RUBBER SS-S-00210

MODULAR WETLAND SYSTEMS INC.
P.O. BOX 869
OCEANSIDE, CA 92049
www.ModularWetlands.com

	NAME	DATE
DRAWN		
REVIEWED		
APPROVED		

COMMENTS:

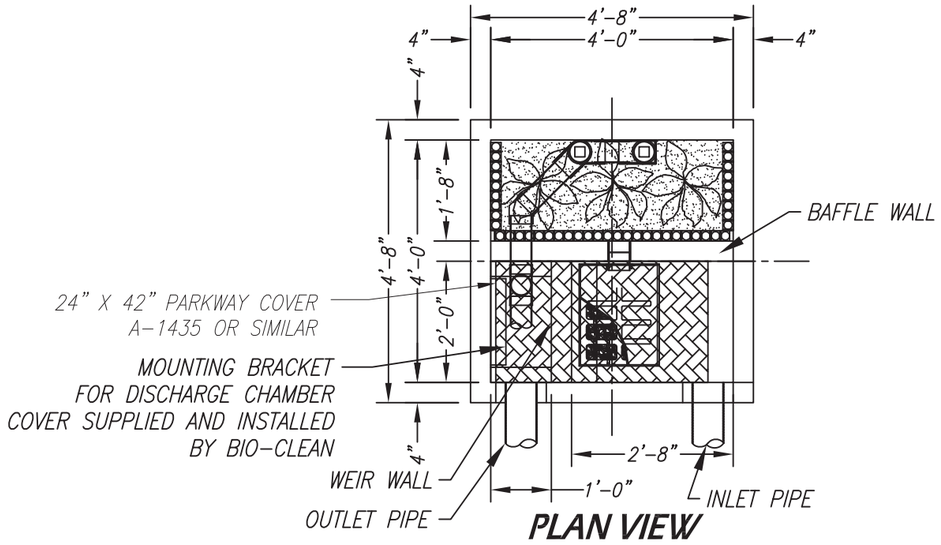
TITLE: MWS LINEAR 2.0 CURB TYPE

SIZE	DWG. NO.	REV
	MWS-L-8-16-V	

SCALE NTS | UNITS = INCHES | SHEET 1 OF 1

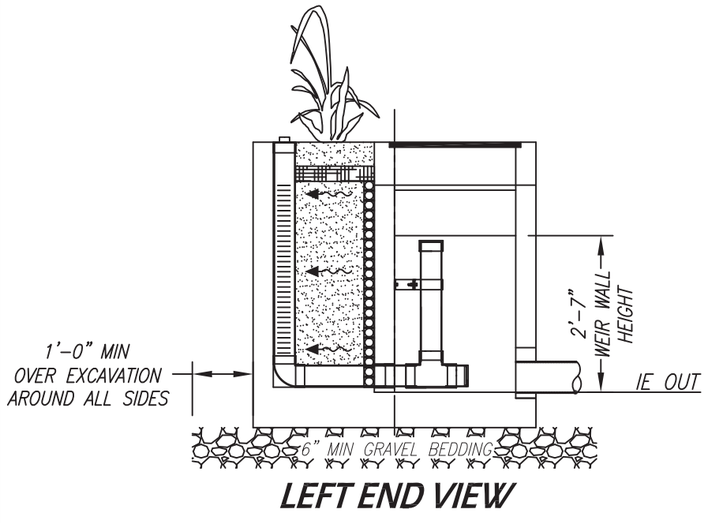
MODULAR WETLAND SYSTEMS - LINEAR 4-4 VAULT TYPE

FLOW RATES
PEAK TREATMENT FLOW RATE = 0.051 CFS OR 22.80 GPM
PEAK BYPASS FLOW RATE = OPTIONAL
SPECIFICATIONS
INSTALL AT SURFACE
O.D. DIMENSIONS = 4.7' X 4.7' X 4.7'
TOP OF CURB TO INVERT OUT = 4.13'
SEDIMENT STORAGE CAPACITY = 1000 LBS OR 23.5 CF

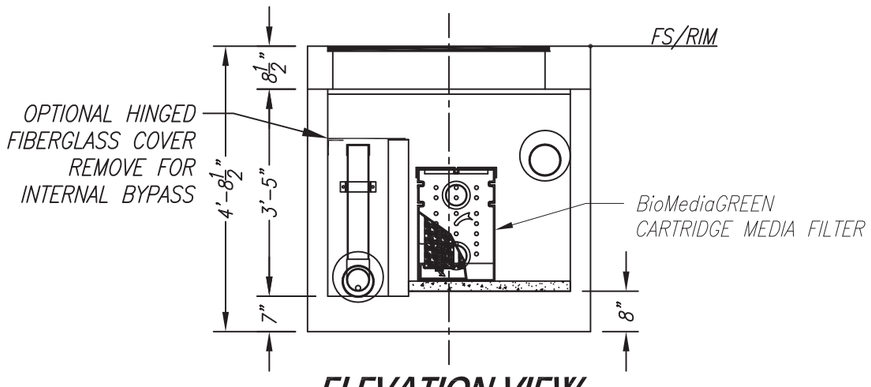


PLAN VIEW

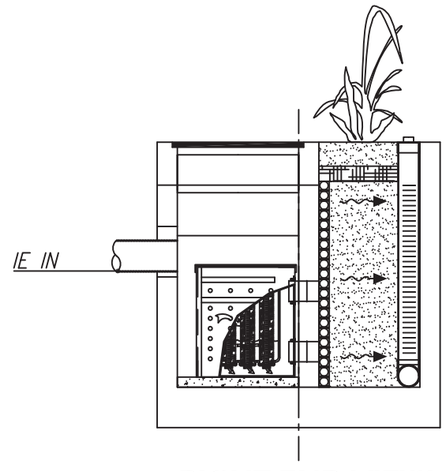
BIOFILTRATION CHAMBER SURFACE AREA CALCS
SIDES = 2
1.5' L x 3.4' H = 5.1 SF
SIDE SURFACE AREA = 10.2 SF
ENDS = 1
3.7' L x 3.4' H = 12.6 SF
END SURFACE AREA = 12.6 SF
TOTAL WETLAND MEDIA SURFACE AREA **= 22.80 SF**
WETLAND MEDIA LOADING RATE 22.80 GPM / 22.80 SF **= 1.00 GPM/SF**
PRETREATMENT FILTER SURFACE AREA CALCS
TOTAL PRETREATMENT SURFACE AREA **= 20 SF**
PRETREATMENT FILTER LOADING RATE 22.80 GPM / 20.00 SF **= 1.14 GPM/SF**



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

LEGEND

- WETLAND MEDIA
- PLANT/ROOT MOISTURE RETENTION LAYER
- MANHOLE / ACCESS HATCH

INSTALLATION NOTES:

1. INSTALL UNIT ON LEVEL BED OF GRAVEL OF AT LEAST 6" IN DEPTH WITH 1' MINIMUM OF OVER EXCAVATION AROUND ENTIRE MWS UNIT.
2. CONCRETE 28 DAY COMPRESSIVE STRENGTH fc=5,000 PSI.
3. REINFORCING: ASTM A-615, GRADE 60.
4. RATED FOR PARKWAY LOADING 300 PSF.
5. JOINT SEALANT: BUTYL RUBBER SS-S-00210

MODULAR WETLAND SYSTEMS INC.
P.O. BOX 869
OCEANSIDE, CA 92049
www.ModularWetlands.com

	NAME	DATE
DRAWN	John Hayden	4/24/13
EDITED		

COMMENTS:

TITLE: MWS LINEAR VAULT TYPE

SIZE	DWG. NO.	REV
	MWS-L-4-4-V	

SCALE NTS | UNITS = INCHES | SHEET 1 OF 1

SITE SPECIFIC DATA*			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS)			
PEAK FLOW RATE (CFS)			
PEAK STORM DURATION (YEARS)			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
OUTLET PIPE 1			
RIM ELEVATION			
SURFACE LOADING REQUIREMENT			
FRAME AND COVER			ø30"
CORROSIVE SOIL CONDITIONS			
KNOWN GROUNDWATER ELEVATION			
NOTES: *PER ENGINEER OF RECORD			

NSBB PERFORMANCE DATA	
TREATMENT FLOW RATE (CFS)	
SETTLING AREA (SF)	26
LOADING RATE (GPM/SF)	
SCREEN SYSTEM STORAGE CAPACITY (CF)	9.15
SEDIMENT STORAGE CAPACITY (CF)	74.04
80% TSS REMOVAL @ – MICRONS	

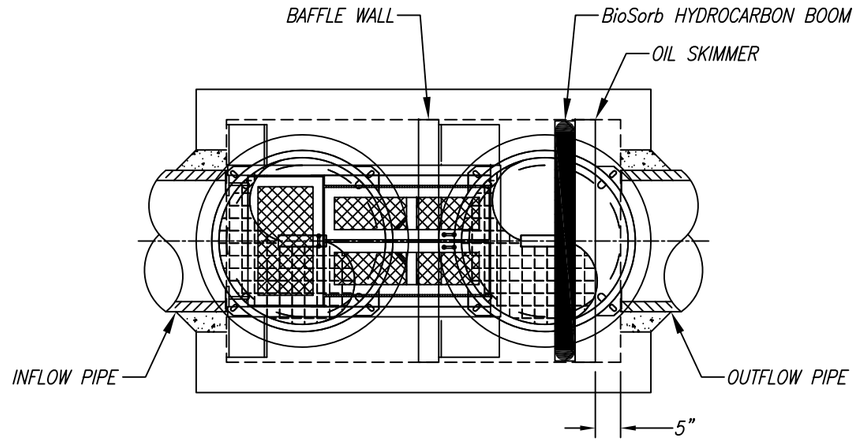
NSBB STORAGE CAPACITIES				
FILTRATION SCREEN CAPACITY				
	LENGTH (FT)	WIDTH (FT)	HEIGHT (FT)	TOTAL (CF)
	2.67	2.17	1.58	9.15
SEDIMENT CHAMBER CAPACITY				
CHAMBER 1	3.17	4.00	3.00	38.04
CHAMBER 2	3.00	4.00	3.00	36.00

GENERAL NOTES

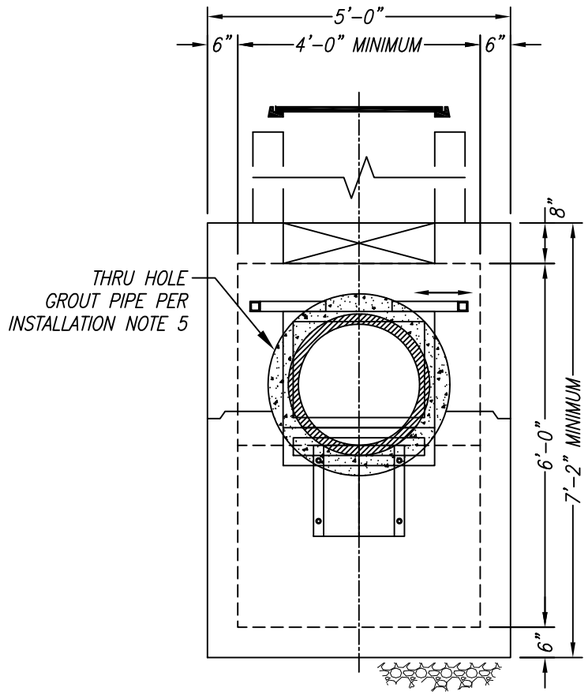
1. BIO CLEAN TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS, AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS, AND ACCESSORIES PLEASE CONTACT BIO CLEAN.
3. SLIDING LIDS FOR SCREEN SYSTEM, SKIMBOSS AND ALTERNATIVE HATCHES AVAILABLE UPON REQUEST.
4. FULL CAPTURE SCREEN AVAILABLE UPON REQUEST.

INSTALLATION NOTES

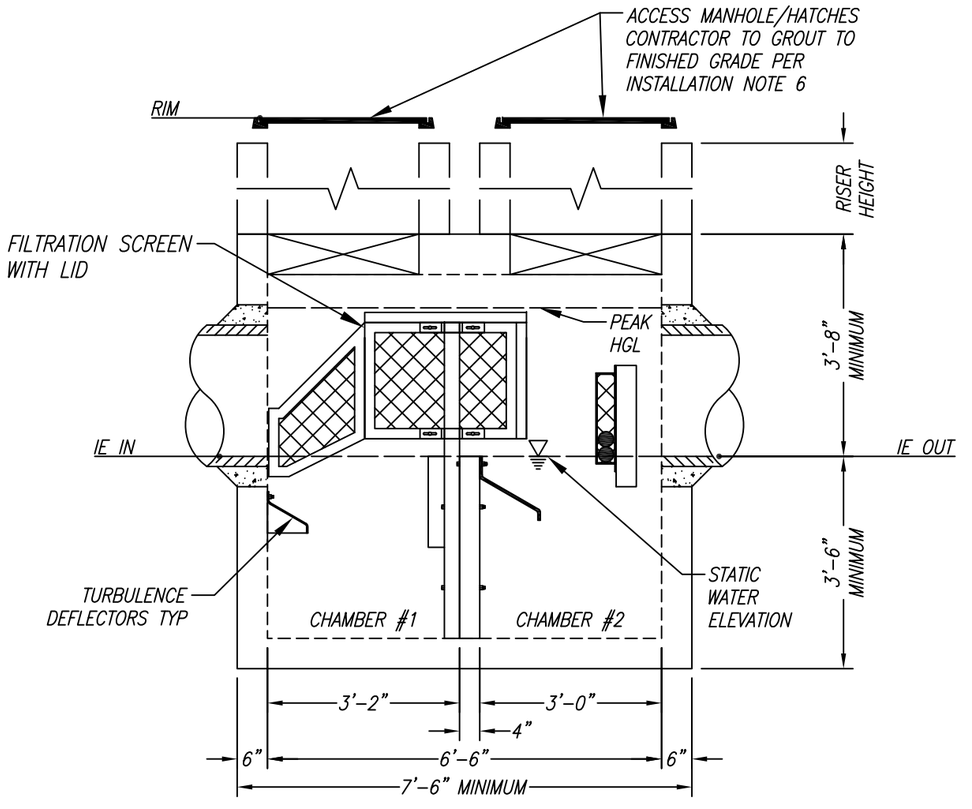
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS, AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE NSBB UNIT AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. MANUFACTURER RECOMMENDS A MINIMUM 6"–12" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH).
4. INVERT OF OUTFLOW PIPE MUST BE 3" ABOVE BOTTOM OF OIL SKIMMER.
5. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON–SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
6. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. ALL COVERS SHALL BE SHIPPED LOOSE. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.



PLAN VIEW
NTS



END VIEW
NTS



ELEVATION VIEW
NTS

BIO CLEAN® ENVIRONMENTAL SERVICES, INC.
biocleanenvironmental.com
P 760.433.7640 F 760.433.3176

NSBB-4-6.5-72
DUAL STAGE HYDRODYNAMIC SEPARATOR
STANDARD DETAIL

5/21/15JUSTIN

UNITED STORM WATER, Inc.
Protecting Our Water Resources

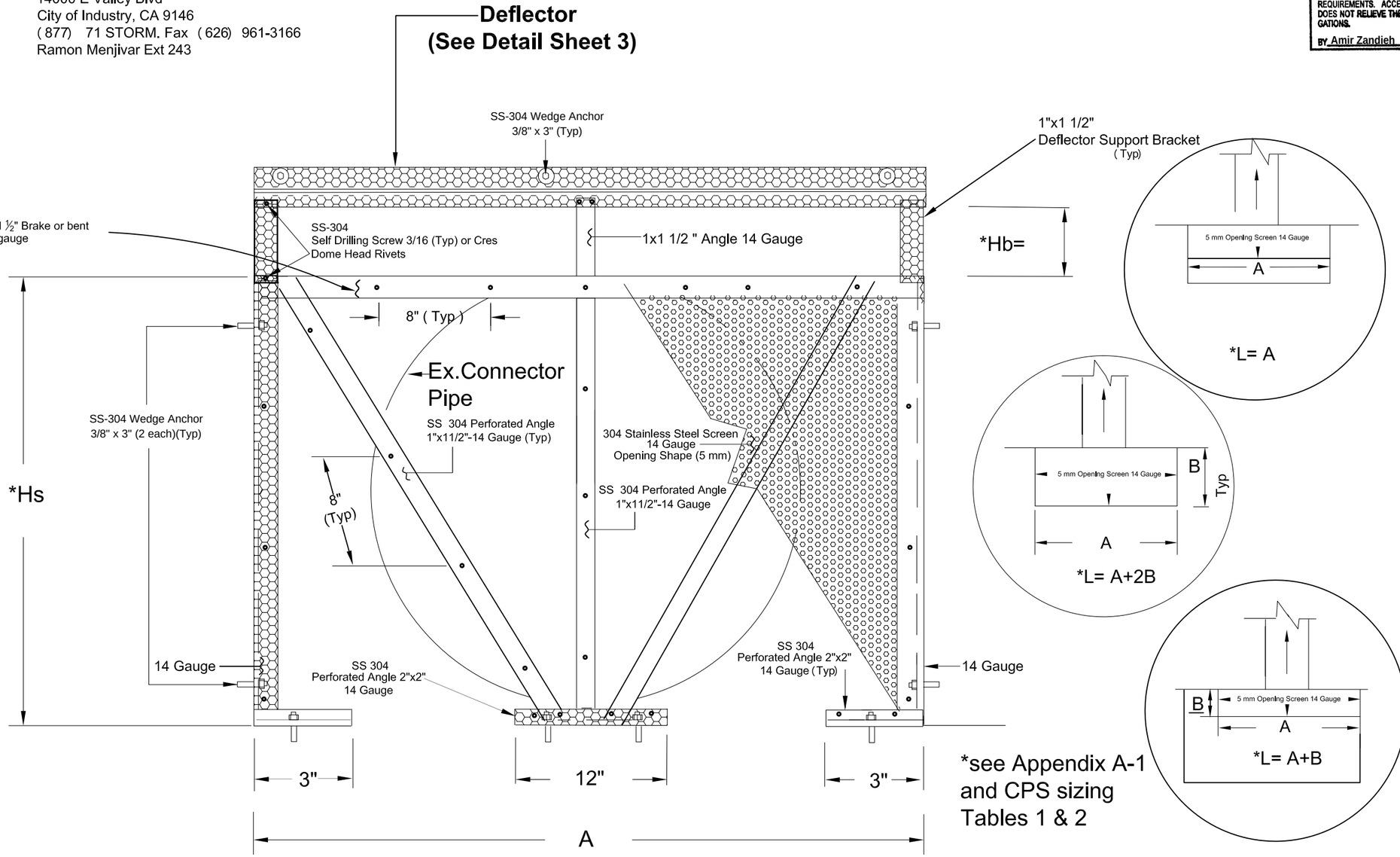
14000 E Valley Blvd
City of Industry, CA 9146
(877) 71 STORM. Fax (626) 961-3166
Ramon Menjivar Ext 243

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS

- [X] ACCEPTED
- [ ] MAKE CORRECTIONS NOTED
- [ ] REVISE CALCULATIONS
- [ ] REJECTED

REVIEW IS PERFORMED BY THE DEPARTMENT TO ENSURE THE CONTRACTOR'S GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE SPECIFICATIONS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE CORRECTNESS OF DIMENSIONS, PROPER CONSTRUCTION AND INSTALLATION METHODS, AND FOR FULFILLING ALL CONTRACTUAL REQUIREMENTS. ACCEPTANCE INDICATED HEREON DOES NOT RELIEVE THE CONTRACTOR OF THESE OBLIGATIONS.

BY Amir Zandieh DATE 06-09-14



*see Appendix A-1
and CPS sizing
Tables 1 & 2

General Notes

No.	Revision/Issue	Date

Firm Name and Address
United Storm Water Inc.
14000 E. Valley Blvd
City of Industry, CA 91746

Project Name and Address
County of Los Angeles .

Project

Date
02-19-2014

Scale
Not to Scale

Sheet
1 of 5

UNITED STORM WATER, Inc.
Protecting Our Water Resources

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City of Industry, CA 9146
(877) 71 STORM. Fax (626) 961-3166
Ramon Menjivar Ext 243

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS

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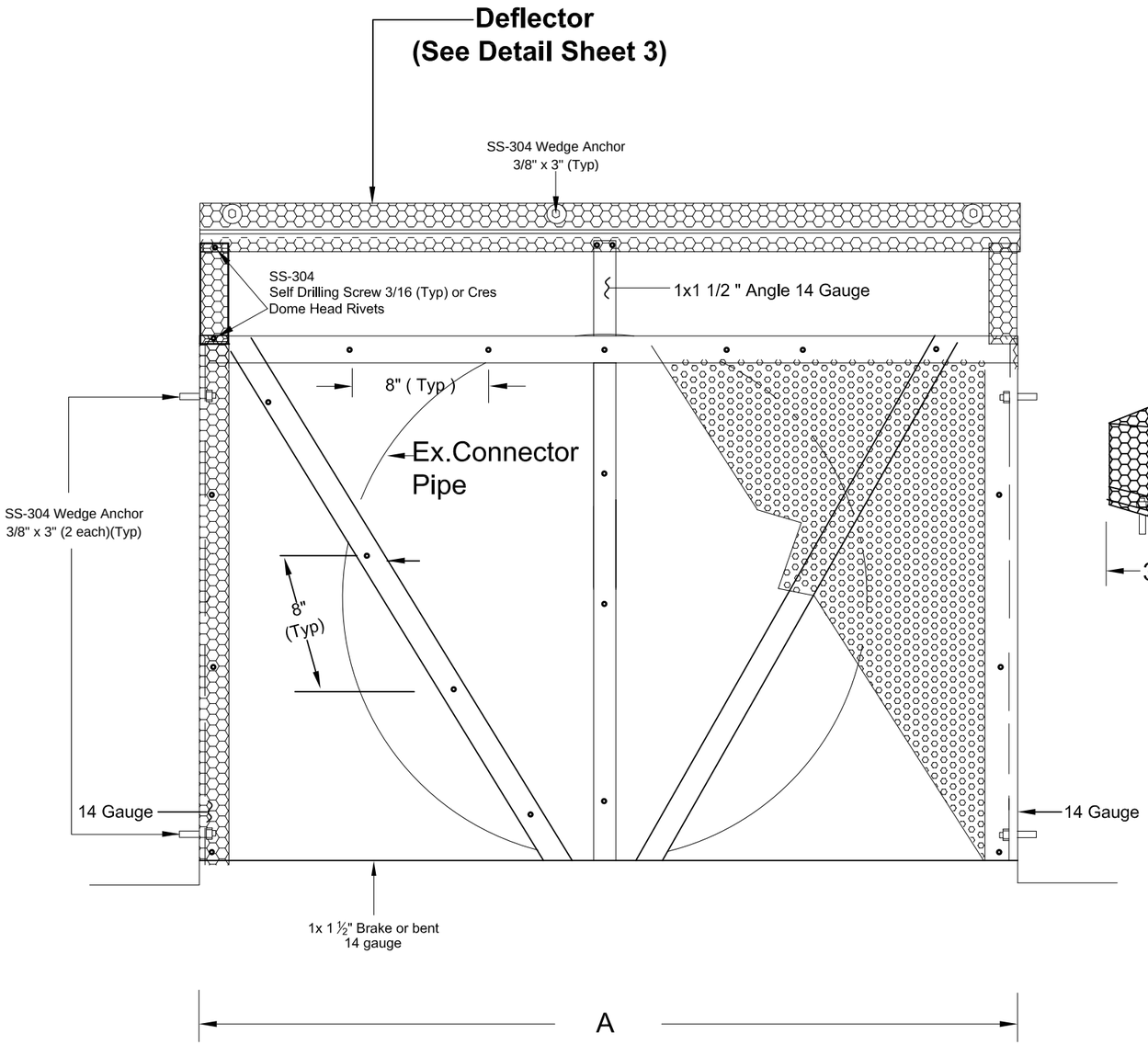
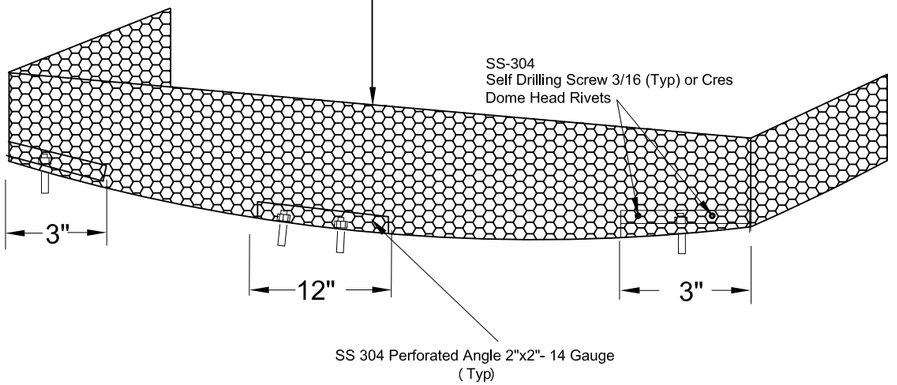
BY Amir Zandieh DATE 06-09-14





Top View

General Notes

No.	Revision/Issue	Date

Firm Name and Address
UNITED STORM WATER, Inc.
United Storm Water Inc.
14000 E. Valley Blvd
City of Industry, CA 91746

Project Name and Address
County of Los Angeles .

Project	Sheet
Date 02-19-2014	2 of 5
Scale Not to Scale	

UNITED STORM WATER, Inc.
Protecting Our Water Resources

14000 E Valley Blvd
City of Industry, CA 91746
(877)71-storm. Fax (626)961-3166
Ramon Menjivar, Ext 243

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS

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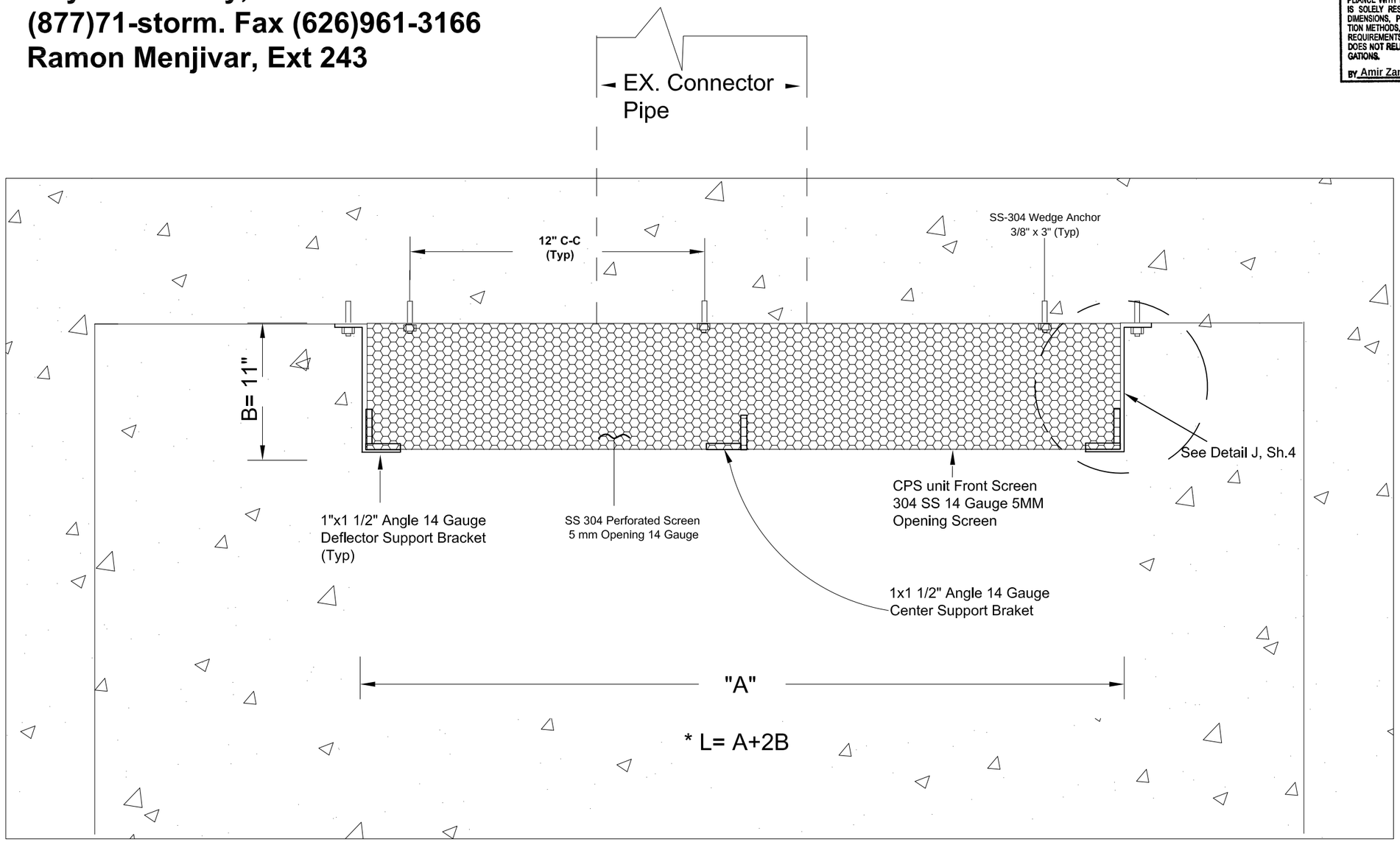
BY Amir Zandieh DATE 06-09-14



* see Appendix A-1 and CPS Sizing Tables 1 & 2

Deflector Detail
Plain View (Sheet 1)
N.T.S.

General Notes

No.	Revision/Issue	Date

Firm Name and Address
United Storm Water Inc.
14000 E. Valley Blvd
City of Industry, CA 91746

Project Name and Address
County of Los Angeles

Project

Date 02-19-2014

Scale Not to Scale

Sheet 3 of 5

UNITED STORM WATER, Inc.
Protecting Our Water Resources

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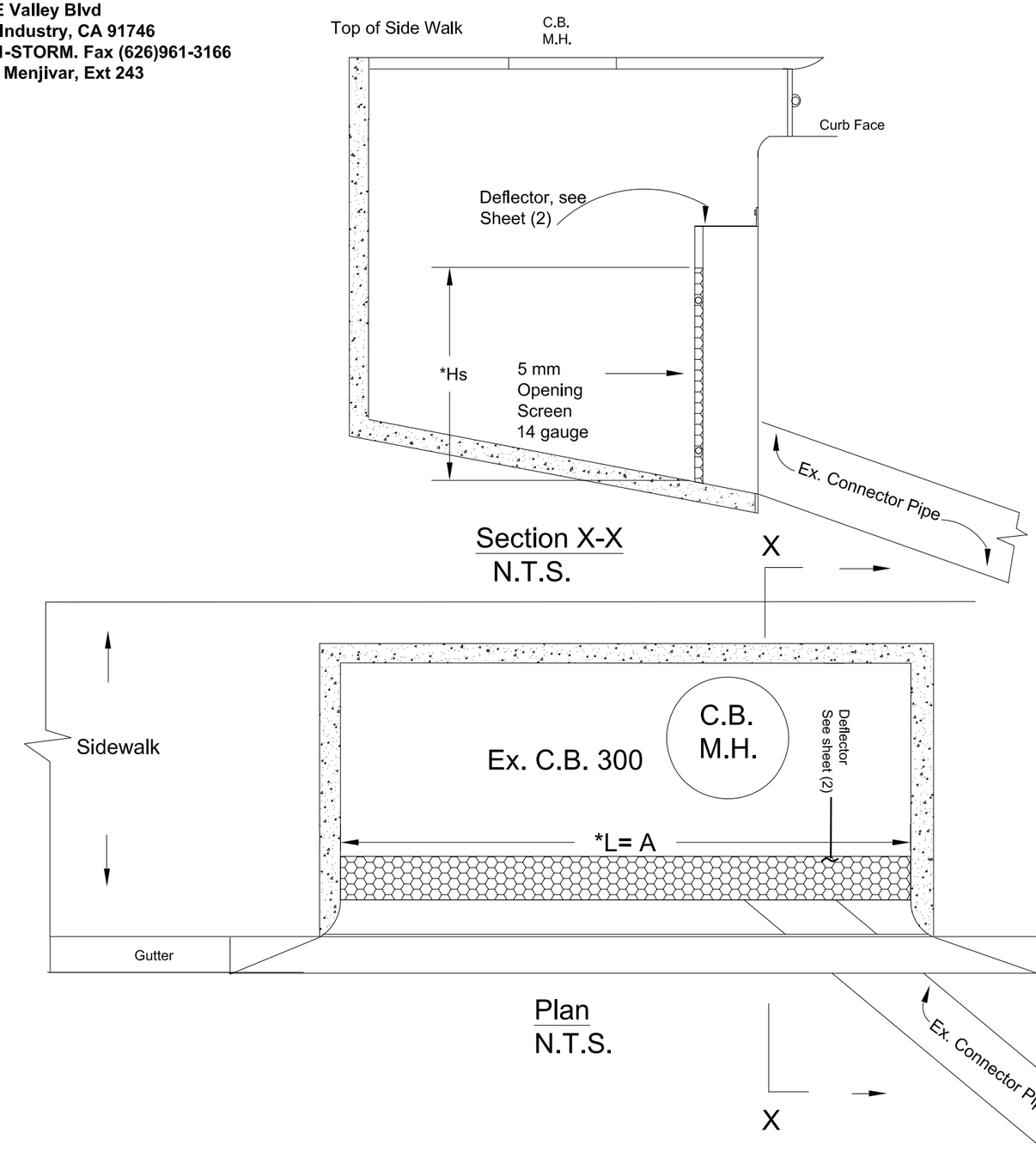
City of Industry, CA 91746
(877) 71-STORM. Fax (626)961-3166
Ramon Menjivar, Ext 243



* See Appendix
A-1 and CPS sizing Tables 1 & 2

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS

- [x] ACCEPTED
- [ ] MAKE CORRECTIONS NOTED
- [ ] REVISE CALCULATIONS
- [ ] REJECTED

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BY Amir Zandieh DATE 06-09-14

General Notes

No.	Revision/Issue	Date

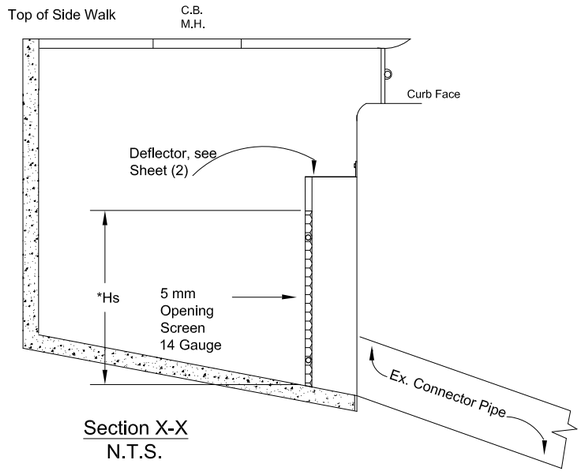
Firm Name and Address
United Storm Water Inc.
14000 E. Valley Blvd
City of Industry, CA 91746

Project Name and Address
County of Los Angeles

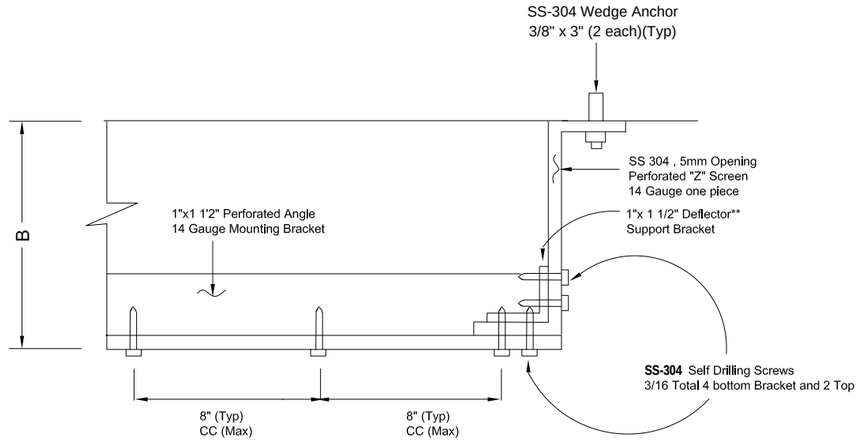
Project	Sheet
Date 02-19-2014	4 of 5
Scale Not to Scale	

UNITED STORM WATER, Inc.
Protecting Our Water Resources

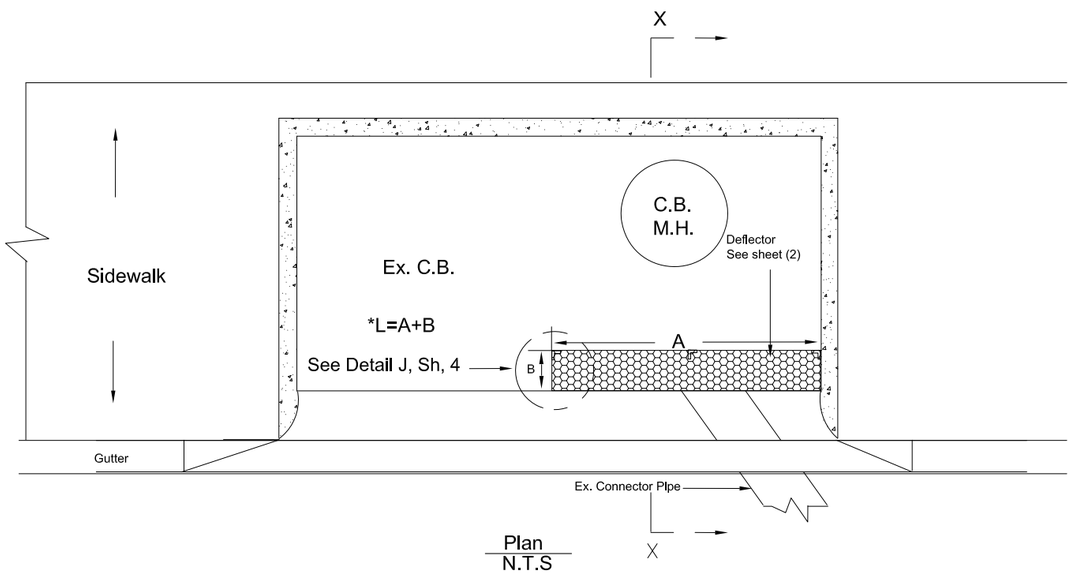
14000 E. Valley Blvd
City of Industry, CA 91746
Ramon Menjivar, Office (877)
71-STORM. Ext 243 (626)890-7104



Section X-X
N.T.S.



Detail J (Sh.2)
NTS



Plan
N.T.S

* See Appendix A-1
and CPS Sizing Tables 1 & 2

** Both legs of Deflector Support Bracket must extend to the top of the Deflector and Also extend at least to the bottom of the Mounting Bracket.

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS

- [X] ACCEPTED
- [ ] MAKE CORRECTIONS NOTED
- [ ] REVISE CALCULATIONS
- [ ] REJECTED

REVIEW IS PERFORMED BY THE DEPARTMENT TO ENSURE THE CONTRACTOR'S GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE SPECIFICATIONS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE CORRECTNESS OF DIMENSIONS, PROPER CONSTRUCTION AND INSTALLATION METHODS, AND FOR FULFILLING ALL CONTRACTUAL REQUIREMENTS. ACCEPTANCE INDICATED HEREON DOES NOT RELIEVE THE CONTRACTOR OF THESE OBLIGATIONS.

BY Amir Zandieh DATE 06-09-14

General Notes

No.	Revision/Issue	Date

Firm Name and Address
United Storm Water Inc.
14000 E. Valley Blvd
City of Industry, CA 91746

Project Name and Address
County of Los Angeles

Project

Date
02-19-2014

Scale
Not to Scale

Sheet
5 of 5

SECTION VII EDUCATIONAL MATERIALS

The educational materials included in this WQMP are provided to inform people involved in future uses, activities, or ownership of the site about the potential pitfalls associated with careless storm water management.

The following educational materials will be provided in Appendix C the Final WQMP.

EDUCATION MATERIALS			
Residential Materials (http://www.ocwatersheds.com)	**Check If Attached**	**Business Materials (http://www.ocwatersheds.com)**	**Check If Attached**
The Ocean Begins at Your Front Door	☒	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☐
Tips for the Home Mechanic	☐	Tips for the Food Service Industry	☒
Homeowners Guide for Sustainable Water Use	☒	Proper Maintenance Practices for Your Business	☒
Household Tips	☒	**Other Materials (http://www.ocwatersheds.com) (https://www.casqa.org/resources/bmp-handbooks)**	**Check If Attached**
Proper Disposal of Household Hazardous Waste	☒		
Recycle at Your Local Used Oil Collection Center (North County)	☒	DF-1 Drainage System Operation & Maintenance	☒
Recycle at Your Local Used Oil Collection Center (Central County)	☐	R-1 Automobile Repair & Maintenance	☐
Recycle at Your Local Used Oil Collection Center (South County)	☐	R-2 Automobile Washing	☐
Tips for Maintaining Septic Tank Systems	☐	R-3 Automobile Parking	☒
Responsible Pest Control	☒	R-4 Home & Garden Care Activities	☒
Sewer Spill	☐	R-5 Disposal of Pet Waste	☒
Tips for the Home Improvement Projects	☒	R-6 Disposal of Green Waste	☒
Tips for Horse Care	☐	R-7 Household Hazardous Waste	☒
Tips for Landscaping and Gardening	☒	R-8 Water Conservation	☒
Tips for Pet Care	☒	SD-10 Site Design & Landscape Planning	☒
Tips for Pool Maintenance	☒	SD-11 Roof Runoff Controls	☒
Tips for Residential Pool, Landscape and Hardscape Drains	☒	SD-12 Efficient Irrigation	☒
Tips for Projects Using Paint	☒	SD-13 Storm Drain Signage	☒
Tips for Protecting Your Watershed	☒	SD-31 Maintenance Bays & Docs	☐
Other: Children's Brochure	☐	SD-32 Trash Storage Areas	☒

APPENDICES

APPENDIX A

SUPPORTING CALCULATIONS

Table 2.7: Infiltration BMP Feasibility Worksheet

	Infeasibility Criteria	*Yes*	*No*
1	**Would Infiltration BMPs pose significant risk for groundwater related concerns?** Refer to Appendix VII (Worksheet I) for guidance on groundwater-related infiltration feasibility criteria.	X	
Provide basis: Per geotechnical investigation (refer to Appendix F), groundwater levels range from 5-7 feet below ground surface (bgs), with a historic high groundwater level at 3 feet bgs. Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	Would Infiltration BMPs **pose significant risk of increasing risk of geotechnical hazards that cannot be mitigated to an acceptable level**? (Yes if the answer to any of the following questions is yes, as established by a geotechnical expert): The BMP can only be located less than 50 feet away from slopes steeper than 15 percent The BMP can only be located less than eight feet from building foundations or an alternative setback. A study prepared by a geotechnical professional or an available watershed study substantiates that stormwater infiltration would potentially result in significantly increased risks of geotechnical hazards that cannot be mitigated to an acceptable level.		X
Provide basis: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
3	Would infiltration of the DCV from drainage area **violate downstream water rights**?		X
Provide basis: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

	Partial Infeasibility Criteria	***Yes***	***No***
4	Is proposed infiltration facility **located on HSG D soils** or the site geotechnical investigation identifies presence of soil characteristics which support categorization as D soils?		X
Provide basis: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
5	Is **measured infiltration rate below proposed facility less than 0.3 inches per hour**? This calculation shall be based on the methods described in Appendix VII.		X
Provide basis: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
6	Would **reduction of over predeveloped conditions cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters?**		X
Provide citation to applicable study and summarize findings relative to the amount of infiltration that is permissible: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
7	Would **an increase in infiltration over predeveloped conditions cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters?**		X

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

Provide citation to applicable study and summarize findings relative to the amount of infiltration that is permissible: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.		
Infiltration Screening Results (check box corresponding to result):		
8	Is there substantial evidence that infiltration from the project would result in a significant increase in I&I to the sanitary sewer that cannot be sufficiently mitigated? (See Appendix XVII) Provide narrative discussion and supporting evidence: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.	
9	If any answer from row 1-3 is yes: infiltration of any volume is **not feasible** within the DMA or equivalent. Provide basis: Summarize findings of infeasibility screening	X
10	If any answer from row 4-7 is yes, infiltration is **permissible but is not presumed to be feasible for the entire DCV.** Criteria for designing biotreatment BMPs to achieve the maximum feasible infiltration and ET shall apply. Provide basis: Summarize findings of infeasibility screening	

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

11	If all answers to rows 1 through 11 are no, infiltration of the full DCV is potentially feasible, BMPs must be designed to infiltrate the full DCV to the maximum extent practicable.	

Harvest & Reuse Irrigation Demand Calculations

1/31/2018

Storm Water Design Caputre Volume (SQDV)

Drainage Area / Land Use Type	Impervious Area (ac)	Irrigated Area (ac)	% impervious	Runoff Coefficient	Design Storm Depth (in)	Drainage Area (acres)	DCV (ft^3)	DCV (gal)
DMA 6	3.27	8.55	90%	0.825	0.70	3.630	**7,609.7**	**56,920**

Blend of High-Use and Low-Use Landscaping

Drainage Area / Land Use Type	Total Area (ac)	Total Area (sf)	% Impervious	Impervious (sf)	Pervious / LA (sf)	Eto	KL	Modified EAWU	EAWU/ Impervious Acre	Minimum EAWU/ Impervious Acre (Table X.6)	Feasible?	EIATA	Minimum EIATA (interpo-lated)	Drawdown (days)	Drawdown (hours)	% Capture (Fig. III.2)
DMA 6	3.630	158,123	90%	142,311	372,438	2.93	0.55	12,803.06	3,918.91	570	Yes	1.60	0.77	4.4	107	70%

TABLE X.6: HARVESTED WATER DEMAND THRESHOLDS FOR MINIMUM PARTIAL CAPTURE

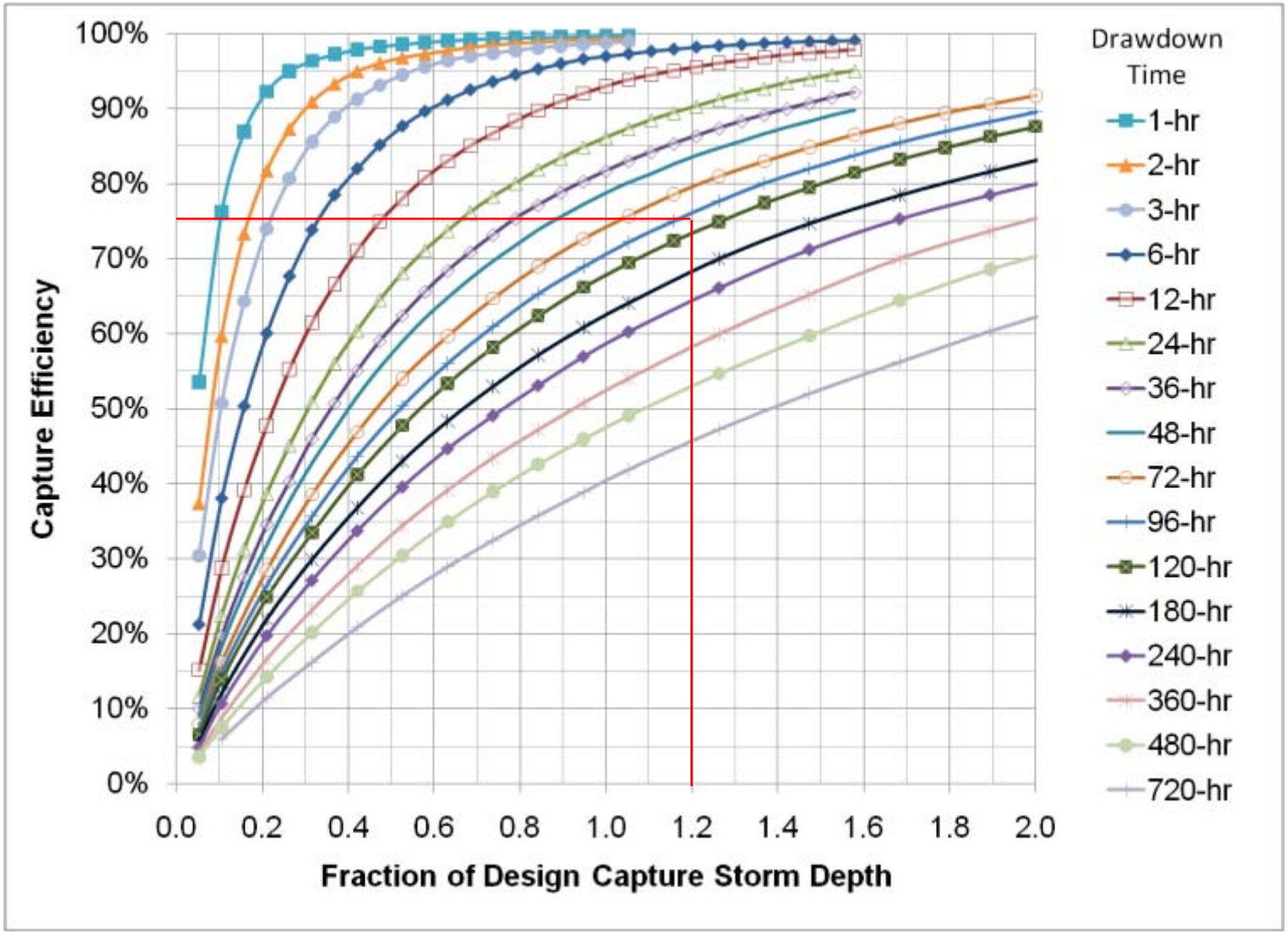
Design Capture Storm Depth, inches	Wet Season Demand Required for Minimum Partial Capture, gpd per impervious acre
0.60	490
0.65	530
0.70	570
0.75	610
0.80	650
0.85	690
0.90	730
0.95	770
1.00	810

TABLE X.8: MINIMUM IRRIGATED AREA FOR POTENTIAL PARTIAL CAPTURE FEASIBILITY

General Landscape Type	Conservation Design: KL = 0.35			Active Turf Areas: KL = 0.7		
Closest ET Station	Irvine	Santa Ana	Laguna	Irvine	Santa Ana	Laguna
Design Capture Storm Depth, inches	Minimum Required Irrigated Area per Tributary Impervious Acre for Potential Partial Capture, ac/ac					
0.60	0.66	0.68	0.72	0.33	0.34	0.36
0.65	0.72	0.73	0.78	0.36	0.37	0.39
0.70	0.77	0.79	0.84	0.39	0.39	0.42
0.75	0.83	0.84	0.9	0.41	0.42	0.45
0.80	0.88	0.9	0.96	0.44	0.45	0.48
0.85	0.93	0.95	1.02	0.47	0.48	0.51
0.90	0.99	1.01	1.08	0.49	0.51	0.54
0.95	1.04	1.07	1.14	0.52	0.53	0.57
1.00	1.1	1.12	1.2	0.55	0.56	0.6

Source: Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs). March 22, 2011. Appendix X.

Figure III.2. Capture Efficiency Nomograph for Constant Drawdown Systems in Orange County



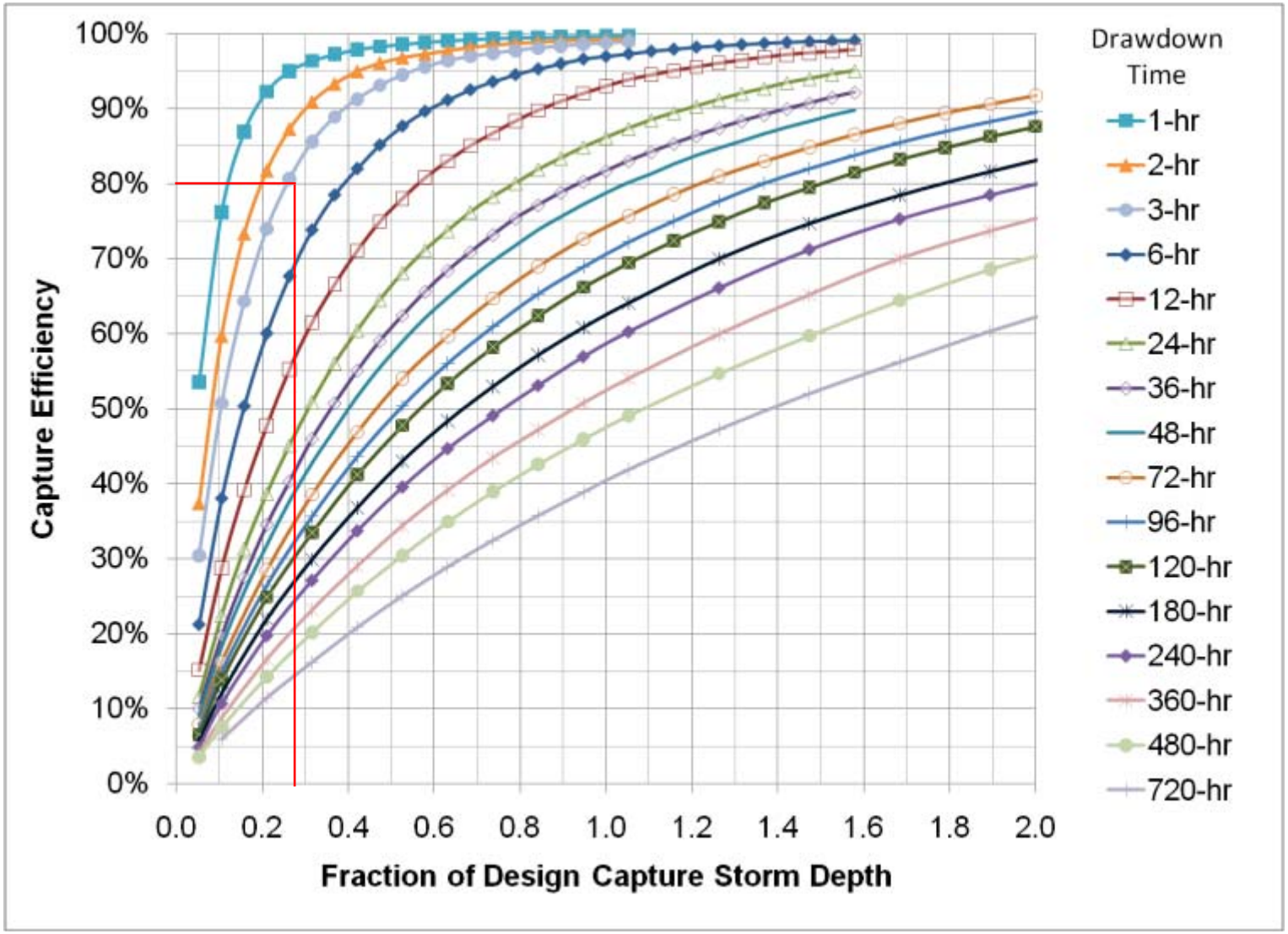
Worksheet B: Simple Design Capture Volume Sizing Method

		DMA =	Total Site	DMA 1	DMA 2	DMA 3	DMA 4	DMA 5	DMA 6	DMA 7	DMA 8	DMA 9	DMA 10	DMA 11	DMA 12	DMA 13	
Step 1: Determine the design capture storm depth used for calculating volume																	
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	0	0	0	0	0	0	0	0	0	0	0	0	0	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	inches
Step 2: Calculate the DCV																	
1	Enter Project area tributary to BMP(s), *A* (acres)	A=	28.990	1.110	12.810	5.330	0.090	0.090	3.630	0.150	0.130	2.700	0.410	0.360	2.020	0.160	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	57.0%	65.0%	65.0%	65.0%	98.0%	98.0%	90.0%	98.0%	98.0%	5.0%	5.0%	5.0%	5.0%	5.0%	%
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	0.578	0.638	0.638	0.638	0.885	0.885	0.825	0.885	0.885	0.188	0.188	0.188	0.188	0.188	
4	Calculate runoff volume, V_{design} = *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=	42,577.6	1,799.5	20,767.0	8,640.8	202.4	202.4	7,609.7	337.3	292.3	1,289.8	195.9	172.0	965.0	76.4	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV																	
Step 3a: Determine design infiltration rate																	
1	Enter measured infiltration rate, $K_{measured}$ (in/hr) (Appendix VII)	$K_{measured}$=	Infiltration not deemed feasible for the site														in/hr
2	Enter combined safety factor from Worksheet H, S_{final} (unitless)	S_{final}=															
3	Calculate design infiltration rate, $K_{design} = K_{measured} / S_{final}$	K_{design}=															in/hr
Step 3b: Determine minimum BMP footprint																	
4	Enter drawdown time, *T* (max 48 hours)	T=	Infiltration not deemed feasible for the site														hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=															feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=															sq-ft

Worksheet C: Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs

			DMA= DMA 1	
Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	0.70	inches
2	Enter calculated drawdown time of the proposed BMP based on equation provided in applicable BMP Fact Sheet, *T* (hours)	T=	3.84	hours
3	Using Figure III.2, determine the "fraction of design capture storm depth" at which the BMP drawdown time (T) line achieves 80% capture efficiency, X_1	X_1=	0.27	
4	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	inches
5	Enter capture efficiency corresponding to d_{HSC}, Y_2 (Worksheet A)	Y_2=	0%	%
6	Using Figure III.2, determine the fraction of "design capture storm depth" at which the drawdown time (T) achieves the equivalent of the upstream capture efficiency (Y_2), X_2	X_2=	0.00	
7	Calculate the fraction of design volume that must be provided by BMP, *fraction* = $X_1 - X_2$	fraction=	0.27	
8	Calculate the resultant design capture storm depth (inches), $d_{fraction}$ = *fraction* × *d*	$d_{fraction}$=	0.1890	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP(s), *A* (acres)	A=	1.110	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	65.0%	%
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	0.638	
4	Calculate runoff volume, V_{design} = *(C x* $d_{rfraction}$ *x A x 43560 x (1/12))*	V_{design}=	485.9	cu-ft
Supporting Calculations				
Describe System:				
		Bioretention with Underdrains (BIO-1):		
		Ponding Depth (d_P) =	*0.5*	ft
		Media Depth (d_{Media}) =	*2.0*	ft
		Media Filtration Rate (K_{Design}) =	*2.5*	in/hr
		Swale Width (W) =	*3.0*	ft
		Minimum Length Required (Lmin) =	*323.9*	ft^2
		Length Provided (L) =	*400.0*	ft^2
		Total Volume Bio-Treated (V) =	*600.0*	ft^3
Provide drawdown time calculations per applicable BMP Fact Sheet:				
		Per Section III.3.2 and Fact Sheet BIO-1:		
		Drawdown (DD or T) = (η_R x d_R) / (K_{Design}) x 12		
		Time to Drawdown Ponding Depth (T_P) =	*3.0*	hours
		Time to Drawdown Effective Depth ($T_{Effective}$) =	*4.8*	hours
		Is $T_{Effective}$ / T_P > 125%?	*160%*	
		If the initial drawdown time (T_P) is greater than 125% of actual drawdown ($T_{Effective}$), revise the initial drawdown time assumption in Step 2		
		Design Drawdown for Step 2 (T) =	*3.8*	hours
		$T_{Effective}$ / T =	*125%*	

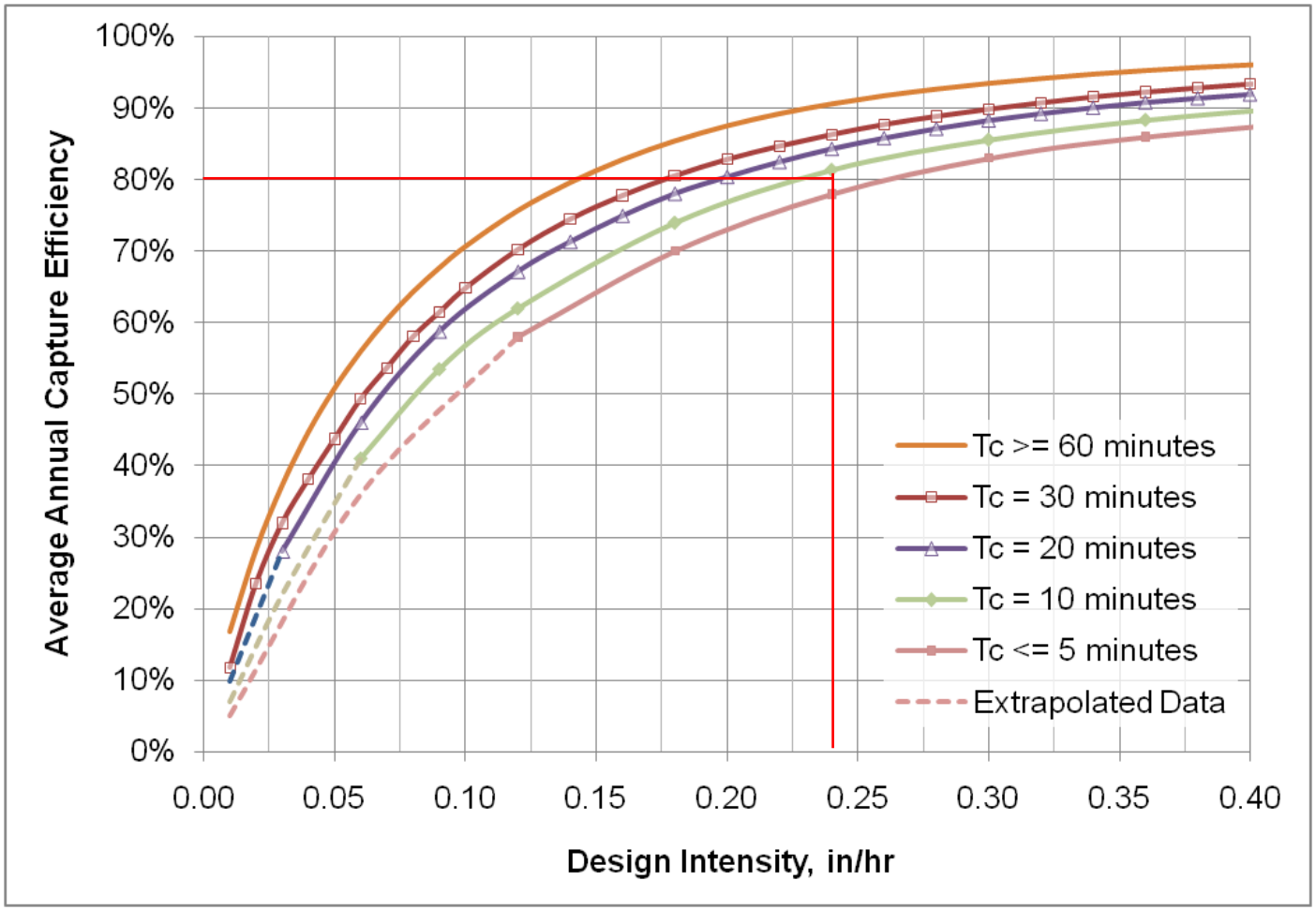
Figure III.2. Capture Efficiency Nomograph for Constant Drawdown Systems in Orange County



Worksheet D: Capture Efficiency Method for Flow-Based BMPs

			DMA 2	DMA 3	DMA 4	DMA 5	DMA 7	DMA 8	
Step 1: Determine the design capture storm depth used for calculating volume									
1	Enter the time of concentration, T_c (min) (See Appendix IV.2)	T_c=	14.5	12.2	8.4	8.4	16.3	16.3	min
2	Using Figure III.4, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1	I_1=	0.220	0.220	0.240	0.240	0.210	0.210	in/hr
3	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	0	0	0	0	0	inches
4	Enter capture efficiency corresponding to d_{HSC}, Y_2 (Worksheet A)	Y_2=	0%	0%	0%	0%	0%	0%	%
5	Using Figure III.4, determine the design intensity at which the time of concentration (T_c) achieves the upstream capture efficiency (Y_2), I_2	I_2=	0	0	0	0	0	0	in/hr
6	Determine the design intensity that must be provided by BMP, $I_{design} = I_1 - I_2$	I_{design}=	0.220	0.220	0.240	0.240	0.210	0.210	in/hr
Step 2: Calculate the design flowrate									
1	Enter Project area tributary to BMP(s), *A* (acres)	A=	12.810	5.330	0.090	0.090	0.150	0.130	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	65.0%	65.0%	98.0%	98.0%	98.0%	98.0%	%
3	Calculate runoff coefficient, $C = (0.75 \times imp) + 0.15$	C=	0.638	0.638	0.885	0.885	0.885	0.885	
4	Calculate design flowrate, $Q_{design} = (C \times i_{design} \times A)$	Q_{design}=	1.798	0.748	0.019	0.019	0.028	0.024	cfs
Supporting Calculations									
Describe System:									
		Hydrodynamic Separator (Pre-1):							
		Unit Size / Model =	*MWS-L-8-24*	*MWS-L-8-16*	*MWS-L-4-4*	*MWS-L-4-4*	*MWS-L-4-4*	*MWS-L-4-4*	
		Unit Size / Model Treatment Capacity =	*0.693*	*0.462*	*0.052*	*0.052*	*0.052*	*0.052*	cfs
		Number of Units Needed =	*3*	*2*	*1*	*1*	*1*	*1*	
		Total Bio-treatment Provided =	*2.079*	*0.924*	*0.052*	*0.052*	*0.052*	*0.052*	cfs
Provide time of concentration assumptions:									
Refer to Proposed Hydrology Exhibit in Section VI for time of concentration									
									min

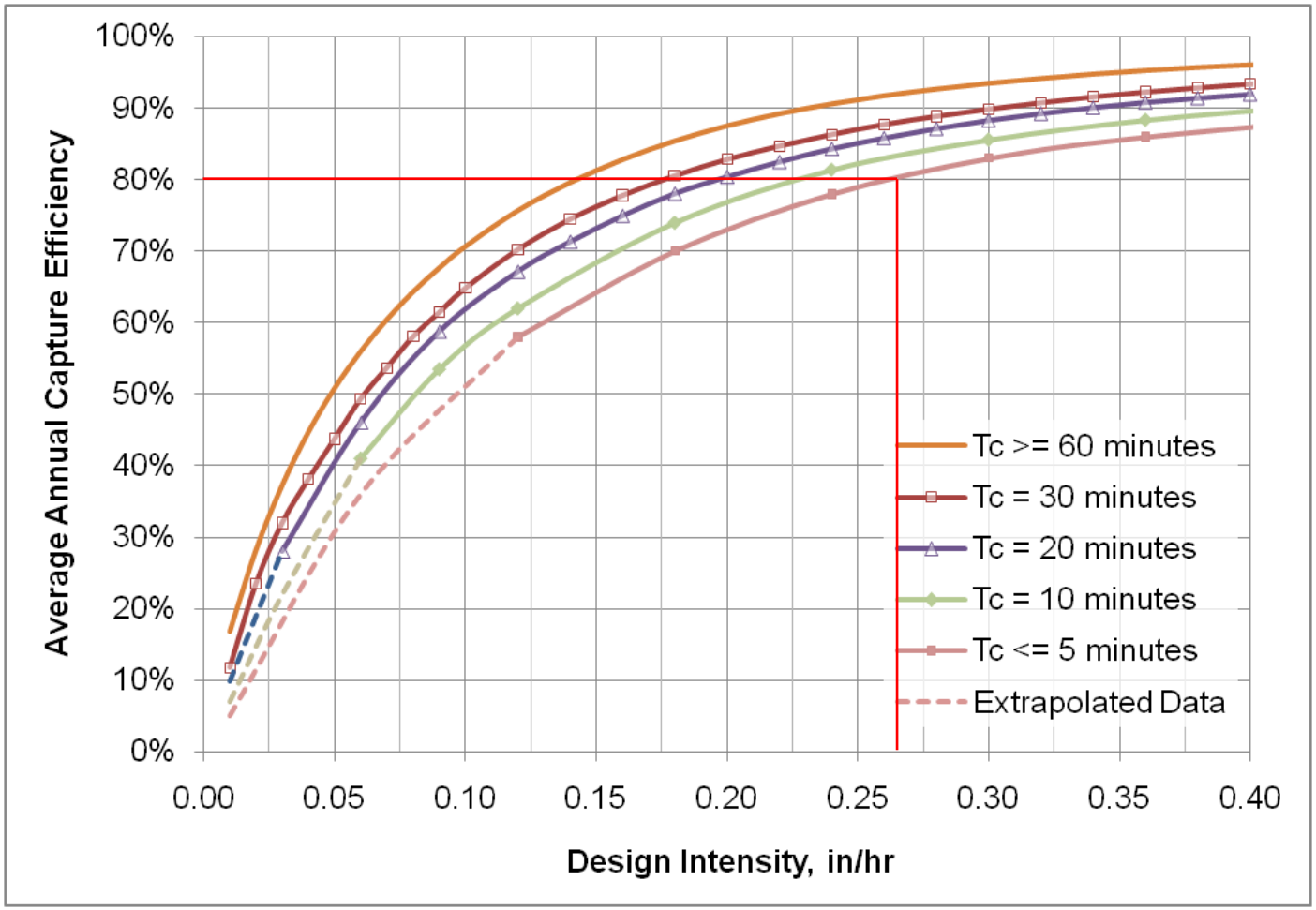
Figure III.4. Capture Efficiency Nomograph for Off-line Flow-based Systems in Orange County



Worksheet D: Capture Efficiency Method for Flow-Based BMPs

			DMA 6	
Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter the time of concentration, T_c (min) (See Appendix IV.2)	T_c=	5.0	min
2	Using Figure III.4, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1	I_1=	0.260	in/hr
3	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	inches
4	Enter capture efficiency corresponding to d_{HSC}, Y_2 (Worksheet A)	Y_2=	0%	%
5	Using Figure III.4, determine the design intensity at which the time of concentration (T_c) achieves the upstream capture efficiency (Y_2), I_2	I_2=	0	in/hr
6	Determine the design intensity that must be provided by BMP, $I_{design} = I_1 - I_2$	I_{design}=	0.260	in/hr
Step 2: Calculate the design flowrate				
1	Enter Project area tributary to BMP(s), A (acres)	A=	3.630	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	90.0%	%
3	Calculate runoff coefficient, $C = (0.75 \times imp) + 0.15$	C=	0.825	
4	Calculate design flowrate, $Q_{design} = (C \times i_{design} \times A)$	Q_{design}=	0.779	cfs
Supporting Calculations				
Describe System:				
		Media Filtration Pre-Treatment		
		Unit Size / Model =	*NSBB-4-6.5-72*	
		Unit Size / Model Treatment Capacity =	*0.868*	cfs
		Number of Units Needed =	*1*	
		Total Treatment Provided =	*0.868*	cfs
Provide time of concentration assumptions:				
Assumed = 5 minutes for conservative estimate				

Figure III.4. Capture Efficiency Nomograph for Off-line Flow-based Systems in Orange County



Worksheet A: Hydrologic Source Control Calculation Form

		Drainage area ID	**See Below**	
		Total drainage area	3.470	acres
		Total drainage area Impervious Area (IA_{total})	0.174	acres
HSC ID	HSC Type/ Description/ Reference BMP Fact Sheet	Effect of individual HSC_i per BMP Fact Sheets (XIV.1) (d_{HSCi})[1]	Impervious Area Tributary to HSC_i (IA_i)	$d_i \times IA_i$
DMA 9	HSC-2: Impervious Area Dispersion, Ratio = 19.0	1.00"	0.1350	0.1350
DMA 10	HSC-2: Impervious Area Dispersion, Ratio = 19.0	1.00"	0.0205	0.0205
DMA 11	HSC-2: Impervious Area Dispersion, Ratio = 19.0	1.00"	0.0180	0.0180
DMA 12	HSC-2: Impervious Area Dispersion, Ratio = 19.0	1.00"	0.1010	0.1010
DMA 13	HSC-2: Impervious Area Dispersion, Ratio = 19.0	1.00"	0.0080	0.0080
	Box 1:		$\sum d_i \times lai =$	0.2825
	Box 2:		$IA_{total} =$	0.174
	[Box 1]/[Box 2]:		$d_{HSC\ total} =$	1.628
			Percent Capture Provided by HSCs (Table III.1)	80%

1 - For HSCs meeting criteria to be considered self-retaining, enter the DCV for the project.

Area	***Impervious Area (SF)***	***Pervious Area (SF)***	***Total Area (SF)***	***Ratio***
DMA 9	*5,880.6*	*111,731.4*	*117,612.0*	*19.0*
DMA 10	*893.0*	*16,966.6*	*17,859.6*	*19.0*
DMA 11	*784.1*	*14,897.5*	*15,681.6*	*19.0*
DMA 12	*4,399.6*	*83,591.6*	*87,991.2*	*19.0*
DMA 13	*348.5*	*6,621.1*	*6,969.6*	*19.0*
Total	*7,557.7*	*143,595.5*	*151,153.2*	*19.0*

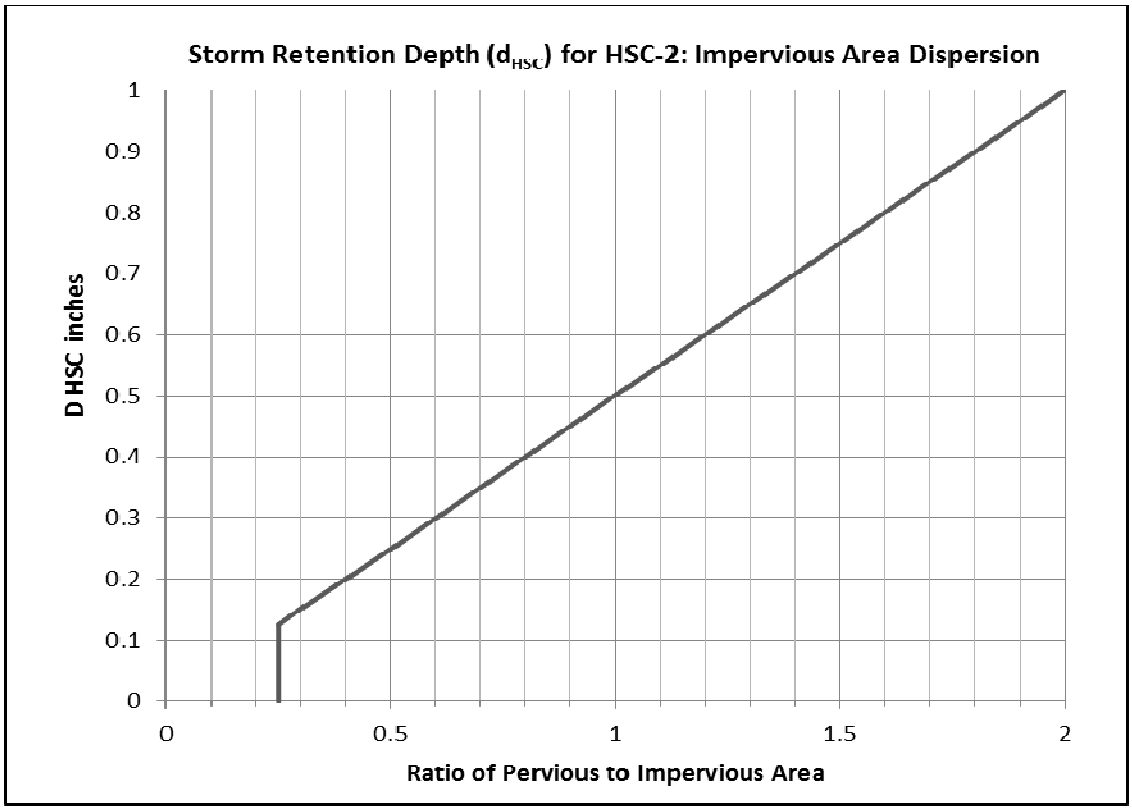


Table III.1: Fraction of Long Term Runoff Reduced (Capture Efficiency) by HSCs

Cumulative HSC Adjustment to Design Capture Storm Depth (d_{HSC})	Capture Efficiency Achieved Lowland Regions (<1,000 ft)	Capture Efficiency Achieved Mountainous Regions (>1,000 ft)
<0.05	0%	0%
0.05"	8%	7%
0.1"	20%	16%
0.2"	37%	31%
0.3"	48%	42%
0.4"	57%	50%
0.5"	64%	57%
0.6"	70%	63%
0.7"	75%	68%
0.8"	80%	72%
0.9"	80%	76%
1.0"	80%	80%

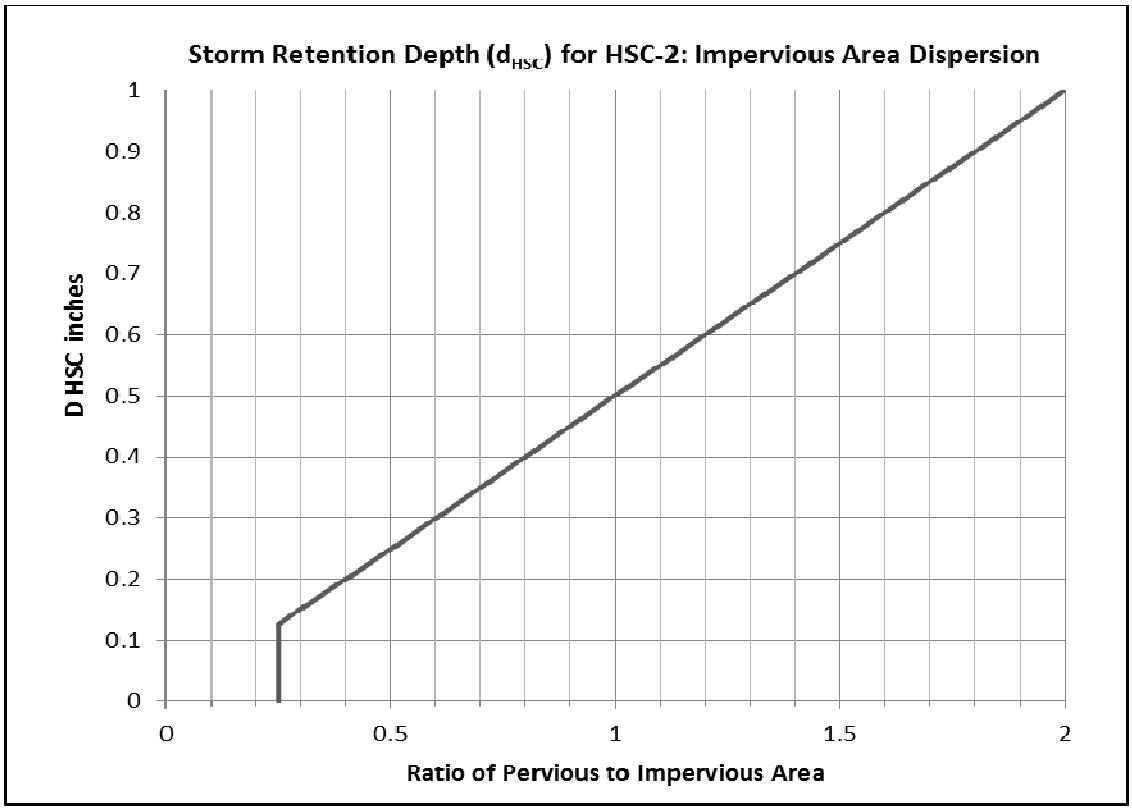


Table III.1: Fraction of Long Term Runoff Reduced (Capture Efficiency) by HSCs

Cumulative HSC Adjustment to Design Capture Storm Depth (d_{HSC})	Capture Efficiency Achieved Lowland Regions (<1,000 ft)	Capture Efficiency Achieved Mountainous Regions (>1,000 ft)
<0.05	0%	0%
0.05"	8%	7%
0.1"	20%	16%
0.2"	37%	31%
0.3"	48%	42%
0.4"	57%	50%
0.5"	64%	57%
0.6"	70%	63%
0.7"	75%	68%
0.8"	80%	72%
0.9"	80%	76%
1.0"	80%	80%

SUBJECT TO FURTHER REVISION

LEGEND

- Orange County Precipitation Stations
- 24 Hour, 85th Percentile Rainfall (Inches)
- 24 Hour, 85th Percentile Rainfall (Inches) - Extrapolated
- City Boundaries

Rainfall Zones

Design Capture Storm Depth (inches)

- 0.65"
- 0.7
- 0.75
- 0.80
- 0.85
- 0.90
- 0.95
- 1.00
- 1.10"

Note: Events defined as 24-hour periods (calendar days) with greater than 0.1 inches of rainfall.
For areas outside of available data coverage, professional judgment shall be applied.

Project Site

0 3 6 12 Kilometers
0 1.8 3.6 7.2 Miles

TITLE: RAINFALL ZONES

JOB: ORANGE COUNTY TECHNICAL GUIDANCE DOCUMENT — ORANGE CO. CA

SCALE	DESIGNED	DRAWING	CHECKED	DATE	JOB NO.
1" = 1.8 miles	TH	TH	BMP	04/22/10	9526-E

PACE Advanced Water Engineering

FIGURE XVI-1

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-1_RainfallZones_20110215.mxd

SUBJECT TO FURTHER REVISION

LEGEND

City Boundaries

Hydrologic Soil Groups

- A Soils
- B Soils
- C Soils
- D Soils

Source:
Soils: Natural Resources Conservation Service (NRCS)
Soil Survey - soil_ca678, Orange County & Western Riverside
Date of publication: 2006-02-08
http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

Project Site

0 2.5 5 10 Kilometers
0 1.8 3.6 7.2 Miles

P: \ 9526E \ 6-GIS \ Mxds \ Reports \ InfiltrationFeasability_20110215 \ 9526E_FigureXVI-2a_HydroSoils_20110215.mxd

TITLE
NRCS HYDROLOGIC SOILS GROUPS

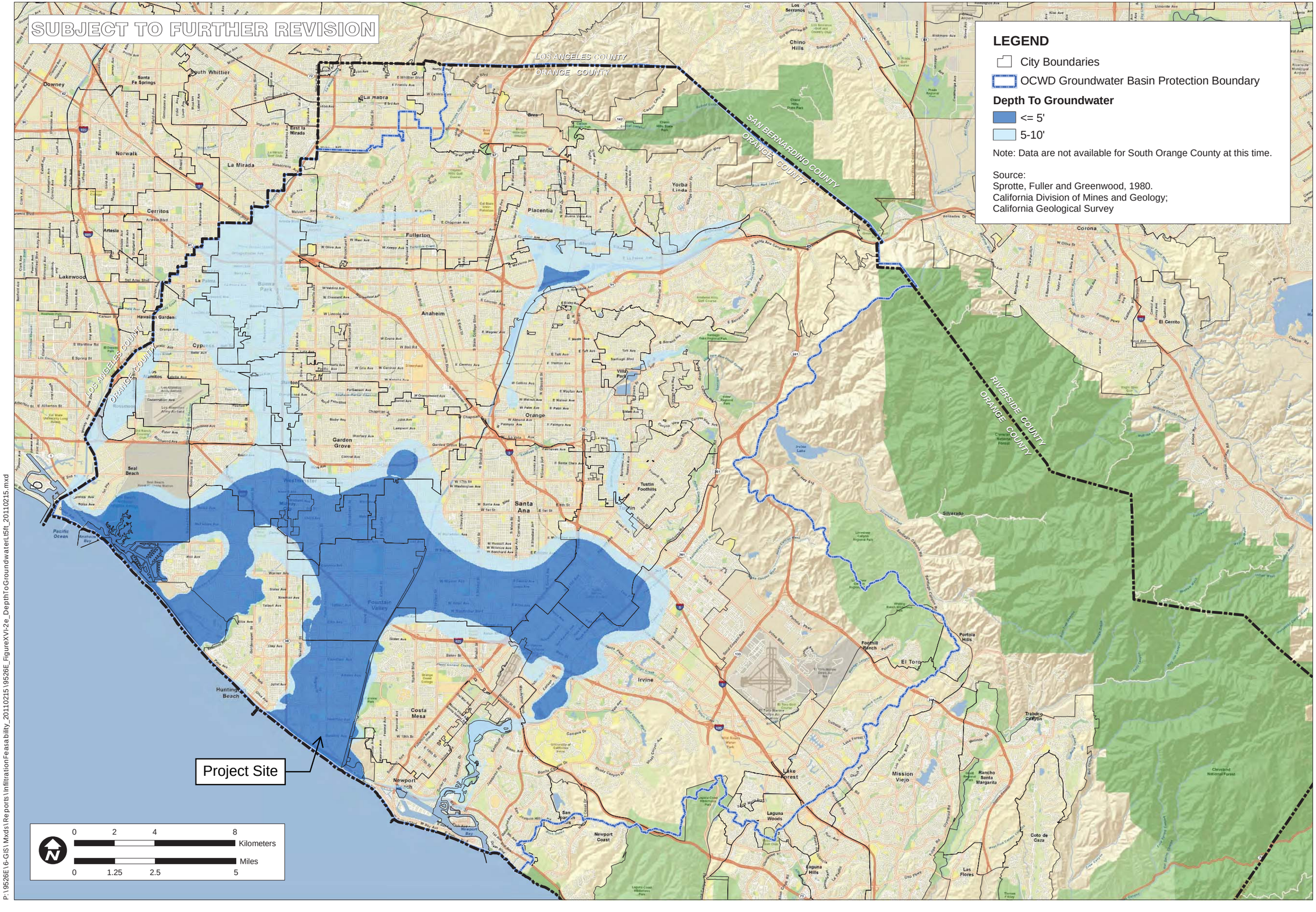
JOB
ORANGE COUNTY INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE Advanced Water Engineering

FIGURE
XVI-2a

SUBJECT TO FURTHER REVISION



LEGEND

- City Boundaries
- OCWD Groundwater Basin Protection Boundary

Depth To Groundwater

- <= 5'
- 5-10'

Note: Data are not available for South Orange County at this time.

Source:
Sprotte, Fuller and Greenwood, 1980.
California Division of Mines and Geology;
California Geological Survey

TITLE

NORTH ORANGE COUNTY
MAPPED SHALLOW GROUNDWATER

ORANGE COUNTY
INFILTRATION STUDY

CA

JOB

ORANGE CO.

SCALE	1" = 1.25 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE

XVI-2e

P:\9526E\16-GIS\Mxds\Reports\Infiltration\Feasability_20110215\9526E_FigureXVI-2e_DepthToGroundwaterLt5ft_20110215.mxd

Susceptibility

Potential Areas of Erosion, Habitat, & Physical Structure Susceptibility

Channel Type

Earth (Unstable)
Earth (Stabilized)
Stabilized

Tidel Influence

<= Mean High Water Line (4.28')

Water Body

Basin
Dam
Lake
Reservoir

Forest Areas

Cleveland National Forest

Federal Lands

Amarus Salt Marsh

San Gabriel-Coyote Creek Watershed

San Bernardino County

Riverside County

South Orange County

Newport Bay Watershed

AnaheimBay-HuntingtonHarbor Watershed

Carbon Canyon

Yorba Linda Reservoir

Miller Retarding Basin

Anaheim Lake

Warner Basin

Kraemer Basin

Olive Hills

Fletcher Retarding Basin

Walnut Canyon Reservoir

Villa Park Dam

Peters Canyon Reservoir

Irvine Lake

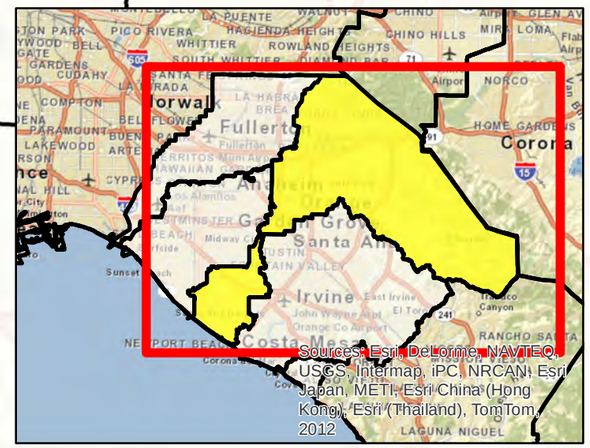
SOUTHPARK PUMP STATION

Bartlett Retarding Basin

Stabilized by Grade Control Structure

Project Site

Cleveland National Forest



0 12,000 24,000 Feet

Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2012

TITLE: SUSCEPTIBILITY ANALYIS SANTA ANA RIVER

JOB: ORANGE COUNTY WATERSHED MASTER PLANNING ORANGE CO. CA

SCALE	1" = 12000'
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/30/10
JOB NO.	9526-E

PACE Advanced Water Engineering

FIGURE 3

P:\9526E\16-GIS\Mxds\SuceptabilityMaps_20100505\9526E_SantaAnaRiverSuscepitibility_20100430.mxd

APPENDIX B

NOTICE OF TRANSFER OF RESPONSIBILITY

NOTICE OF TRANSFER OF RESPONSIBILITY

WATER QUALITY MANAGEMENT PLAN

Magnolia Tank Farm
APN 114-150-36 & 114-481-32

Submission of this Notice Of Transfer of Responsibility constitutes notice to the City of Huntington Beach that responsibility for the Water Quality Management Plan ("WQMP") for the subject property identified below, and implementation of that plan, is being transferred from the Previous Owner (and his/her agent) of the site (or a portion thereof) to the New Owner, as further described below.

I. Previous Owner/ Previous Responsible Party Information

Company/ Individual Name:		Contact Person:	
Street Address:		Title:	
City:	State:	ZIP:	Phone:

II. Information about Site Transferred

Name of Project (if applicable):	
Title of WQMP Applicable to site:	
Street Address of Site (if applicable):	
Planning Area (PA) and/ or Tract Number(s) for Site:	Lot Numbers (if Site is a portion of a tract):
Date WQMP Prepared (and revised if applicable):	

III. New Owner/ New Responsible Party Information

Company/ Individual Name:		Contact Person:	
Street Address:		Title:	
City:	State:	ZIP:	Phone:

IV. Ownership Transfer Information

General Description of Site Transferred to New Owner:	General Description of Portion of Project/ Parcel Subject to WQMP Retained by Owner (if any):

Lot/ Tract Numbers of Site Transferred to New Owner:
Remaining Lot/ Tract Numbers Subject to WQMP Still Held by Owner (if any):
Date of Ownership Transfer:

Note: When the Previous Owner is transferring a Site that is a portion of a larger project/ parcel addressed by the WQMP, as opposed to the entire project/parcel addressed by the WQMP, the General Description of the Site transferred and the remainder of the project/ parcel no transferred shall be set forth as maps attached to this notice. These maps shall show those portions of a project/ parcel addressed by the WQMP that are transferred to the New Owner (the Transferred Site), those portions retained by the Previous Owner, and those portions previously transferred by Previous Owner. Those portions retained by Previous Owner shall be labeled as "Previously Transferred".

V. Purpose of Notice of Transfer

The purposes of this Notice of Transfer of Responsibility are: 1) to track transfer of responsibility for implementation and amendment of the WQMP when property to which the WQMP is transferred from the Previous Owner to the New Owner, and 2) to facilitate notification to a transferee of property subject to a WQMP that such New Order is now the Responsible Party of record for the WQMP for those portions of the site that it owns.

VI. Certifications

A. Previous Owner

I certify under penalty of law that I am no longer the owner of the Transferred Site as described in Section II above. I have provided the New Owner with a copy of the WQMP applicable to the Transferred Site that the New Owner is acquiring from the Previous Owner.

Printed Name of Previous Owner Representative:	Title:
Signature of Previous Owner Representative:	Date:

B. New Owner

I certify under penalty of law that I am the owner of the Transferred Site, as described in Section II above, that I have been provided a copy of the WQMP, and that I have informed myself and understand the New Owner's responsibilities related to the WQMP, its implementation, and Best Management Practices associated with it. I understand that by signing this notice, the New Owner is accepting all ongoing responsibilities for implementation and amendment of the WQMP for the Transferred Site, which the New Owner has acquired from the Previous Owner.

Printed Name of New Owner Representative:	Title:
Signature:	Date:

APPENDIX C

EDUCATIONAL MATERIALS

(PLACEHOLDER)

APPENDIX D

BMP MAINTENANCE SUPPLEMENT / O&M PLAN

OPERATIONS AND MAINTENANCE (O&M) PLAN

Water Quality Management Plan

For

Magnolia Tank Farm

21845 Magnolia Street, Huntington Beach, CA 92646

APN 114-150-36 & 114-481-32

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BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX			
BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
NON-STRUCTURAL SOURCE CONTROL BMPs			
Yes	N1. Education for Property Owners, Tenants and Occupants	Educational materials will be provided to tenants annually. Materials to be distributed are found in Appendix C of the Final WQMP. Tenants will be provided these materials by the HOA prior to occupancy and annually thereafter. Frequency: Annually	Owner/HOA
Yes	N2. Activity Restrictions	The Owner/HOA will prescribe activity restrictions to protect surface water quality, through lease terms or other equally effective measure, for the property. Restrictions include, but are not limited to, prohibiting vehicle maintenance or vehicle washing. Frequency: Ongoing	Owner/HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX			
BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	N3. Common Area Landscape Management	Maintenance shall be consistent with City requirements. Fertilizer and/or pesticide usage shall be consistent with County Management Guidelines for Use of Fertilizers (OC DAMP Section 5.5) as well as local requirements. Maintenance includes mowing, weeding, and debris removal on a weekly basis. Trimming, replanting, and replacement of mulch shall be performed on an as-needed basis to prevent exposure of erodible surfaces. Trimmings, clippings, and other landscape wastes shall be properly disposed of in accordance with local regulations. Materials temporarily stockpiled during maintenance activities shall be placed away from water courses and storm drain inlets. Frequency: Monthly	Owner/HOA
Yes	N4. BMP Maintenance	Maintenance of structural BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP (Appendix D). Records of inspections and BMP maintenance shall be kept by the Owner/HOA and shall be available for review upon request. Frequency: Ongoing	Owner/HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX			
BMP Applicable? Yes/No	**BMP Name and BMP Implementation, Maintenance and Inspection Procedures**	**Implementation, Maintenance, and Inspection Frequency and Schedule**	**Person or Entity with Operation & Maintenance Responsibility**
Yes	N11. Common Area Litter Control	Litter patrol, violations investigations, reporting and other litter control activities shall be performed on a weekly basis and in conjunction with routine maintenance activities. Frequency: Weekly	Owner/HOA
Yes	N12. Employee Training	The Owner/HOA shall educate all new employees/ managers on storm water pollution prevention, particularly good housekeeping practices, prior to the start of the rainy season (October 1). Refresher courses shall be conducted as needed. Materials that may be utilized on BMP maintenance are included in Appendix D. Frequency: Annually	Owner/HOA
Yes	N14. Common Area Catch Basin Inspection	On-site catch basin inlets and other drainage facilities shall be inspected at least once per year, prior to the start of the rainy season (October 1st). Inlets and other facilities shall be cleaned when the sump is 40% full and annually at a minimum. Frequency: Annually	Owner/HOA
Yes	N15. Street Sweeping Private Streets and Parking Lots	Streets, parking areas and alleyways within the project shall be swept at a minimum frequency quarterly as well as once per year prior to the storm season, no later than October 1 each year. Frequency: Quarterly	Owner/HOA
STRUCTURAL SOURCE CONTROL BMPs			

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX			
BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	S1. Provide storm drain system stenciling and signage	On-site storm drain stencils shall be inspected for legibility, at minimum, once prior to the storm season, no later than October 1 each year. Those determined to be illegible will be re-stenciled as soon as possible. Frequency: Annually	Owner/HOA
Yes	S3. Design and construct trash and waste storage areas to reduce pollution introduction	Sweep trash area at least once per week and before October 1st each year. Maintain area clean of trash and debris at all times. Frequency: Weekly	Owner/HOA
Yes	S4. Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	In conjunction with routine maintenance, verify that landscape design continues to function properly by adjusting systems to eliminate overspray to hardscape areas and to verify that irrigation timing and cycle lengths are adjusted in accordance to water demands, given the time of year, weather, and day or nighttime temperatures. System testing shall occur once per year. Water from testing/flushing shall be collected and properly disposed to the sewer system and shall not discharge to the storm drain system. Frequency: Monthly	Owner/HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX			
BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	S5. Protect slopes and channels and provide energy dissipation	In conjunction with routine landscape maintenance activities, verify that slopes and channels do not exhibit erosive conditions (exposed soils) by ensuring that they are properly vegetated and stabilized. Frequency: Monthly	Owner/HOA
Yes	S13. Wash water control for food preparation areas	Inspection / maintenance shall occur at least once in the late summer / early fall, prior to the start of the rainy season. Maintenance includes using dry cleanup methods for cleaning (i.e., sweeping), keeping spill kits on-site and stocked, properly storing and hauling used oil and grease, and disposing wash water to sanitary sewer. Wash water shall not discharge to storm drain system. Mats shall be cleaned indoors or with dry cleaning methods only. Frequency: Annually	Owner/HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX		
BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
LOW IMPACT DEVELOPMENT BMPs		

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX		
BMP Name and BMP Implementation, Maintenance and Inspection Procedures	**Implementation, Maintenance, and Inspection Frequency and Schedule**	**Person or Entity with Operation & Maintenance Responsibility**
Hydrologic Source Control BMP # 1: Impervious Area Dispersion	In conjunction with routine landscaping maintenance activities, maintain vegetative cover and/or mulch to eliminate exposed soils. Any eroded surfaces to be repaired immediately. Inspections to be performed twice each year (spring and fall) and after major storm events to check for signs of erosion, gullies, and sloughing. Frequency: Monthly	Owner/HOA
Harvest and use BMP # 1: Underground Detention Cistern	Inspect system via the maintenance port for infiltration of collected runoff after major rain events and at least semi-annually, once prior to the rainy season and once after the rainy season. Ensure that facility drains within 48-72 hours. Should drawdown times get significantly reduced due to sediment build-up, flush system by injecting high pressure water via the maintenance port and remove sediment laden water via sump pump. Frequency: 2x per year Inspections Cleanout Annually (min.)	Owner/HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX		
BMP Name and BMP Implementation, Maintenance and Inspection Procedures	**Implementation, Maintenance, and Inspection Frequency and Schedule**	**Person or Entity with Operation & Maintenance Responsibility**
Biotreatment BMP # 1: Bioretention Swale	Inspect BMPs semi-annually or after major storm events to check for maintenance needs and function. Routine maintenance shall be performed in conjunction with routine maintenance activities to ensure consistently high performance and extend facility life. Routine maintenance activities include: ▪ Maintain vegetation and media to perpetuate a robust vegetative and microbial community (thin/trim vegetation, replace spent media and mulch). ▪ Periodically remove dead vegetative biomass to prevent export of nutrients or clogging of the system. ▪ Remove accumulated sediment before it significantly interferes with system function. ▪ Conduct maintenance to prevent surface clogging (surface scarring, raking, mulch replacement, etc.). ▪ Maintain splash blocks/energy dissipation and scour-protection as required based on facility inspection. ▪ Routinely remove accumulated sediment at the inlet and outlet and trash and debris from the area. Repair torn or broken liners as necessary. Frequency: 2x per year	Owner/HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX		
BMP Name and BMP Implementation, Maintenance and Inspection Procedures	**Implementation, Maintenance, and Inspection Frequency and Schedule**	**Person or Entity with Operation & Maintenance Responsibility**
Biotreatment BMP # 2: Modular Wetland Systems	The Modular Wetland units shall be maintained in accordance with manufacturer's specifications. The system shall be inspected at a minimum of once every six months, prior to the start of the rainy season (October 1) each year, and after major storm events. Typical maintenance includes: ▪ Removing trash & debris from the catch basin screening filter (by hand). ▪ Removal of sediment and solids in the settlement chamber (vacuum truck). ▪ Replacement of the BioMediaGREEN™ filter cartridge and drain-down filter (if equipped) ▪ Trim plants within the wetland chamber as needed in conjunction with routine landscape maintenance activities. No fertilizer shall be used. Wetland chamber should be inspected during rain events to verify flow through the system. If little to no flow is observed from the lower valve or orifice plate, the wetland media may require replacement. Frequency: 2x per year	Owner/HOA
PRE-TREATMENT/GROSS SOLIDS REMOVAL BMPs		

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX		
BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Pre-Treatment BMP # 1	Typical maintenance includes inspecting the system at a minimum of once every six months. The cleaning and debris removal maintenance from the settling chamber a minimum of once year and replacement of hydrocarbon booms once a year. The procedure is easily done with the use of any standard vacuum truck. Media shall be replaced when it has become 75% clogged, typically once per year at a minimum. Frequency: 2x per year	Owner/HOA

Required Permits

Permits are not required for the implementation, operation, and maintenance of the BMPs.

Forms to Record BMP Implementation, Maintenance, and Inspection

The form that will be used to record implementation, maintenance, and inspection of BMPs is attached.

Recordkeeping

All records must be maintained for at least five (5) years and must be made available for review upon request.

Waste Management

Any waste generated from maintenance activities will be disposed of properly. Wash water and other waste from maintenance activities is not to be discharged or disposed of into the storm drain system. Clippings from landscape maintenance (i.e. prunings) will be collected and disposed of properly off-site, and will not be washed into the streets, local area drains/conveyances, or catch basin inlets.

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

Modular Wetland System - Linear® Plants for Hardy Zone 10

Common Name ***Latin Name***	**Light Exposure**	**Hardy Range**	**Height**	**Flower Color**
canna, canna tropicana, canna lilly *Canna X generalis*	full sun to partial shade	USDA Zones 8-11	2.5 to 8 feet	yellow, orange, red
Lily-of-the-Nile, African Lily, African Blue Lily *Agapanthus spp*	full sun to partial shade	USDA Zones 8-11	2 to 4 feet	blue
Vetiveria zizanioides (L.) Nash Vetiver Grass	full sun	USDA Zones 5-11	2 to 8 feet	green
giant wild rye *Leymus condensatus*	full sun	USDA Zones 3-11	4 to 8 feet	brown
society garlic, pink agapanthus *Tulbaghia violacea*	full sun to full shade	USDA Zones 7-10	1.5 to 3 feet	lavender
Gulf muhlygrass, mist grass, hairawn muhly *Muhlenbergia capillaris*	full sun to partial shade	USDA Zones 5-10	2 to 3 feet	pinkish purple
Lindheimer's muhlygrass, blue muhlygrass *Muhlenbergia lindheimeri*	full sun	USDA Zones 7-11	2 to 4 feet	purple to gray
horsetail, scouring rush, E. prealtum *Equisetum hyemale*	full sun to light shade	USDA Zones 3-11	2 to 4 feet	n/a
cattail, reed-mace *Typha latifolia*	full sun	USDA Zones 2-11	3 to 9 feet	brown
papyrus, Egyptian papyrus, bulrushes *Cyperus papyrus*	full sun to partial shade	USDA Zones 9-11	2 to 10 feet	white
lavender *Lavandula L.*	sun	USDA Zones 5-10	1 to 2 feet	purple

palm sedge *Carex phyllocephala*	full sun to full shade	USDA Zones 7-10	1 to 2 feet	green
lemongrass, oil grass *Cymbopogon citratus*	full sun to partial shade	USDA Zones 10-11	4 to 6 feet	n/a
umbrella sedge, umbrella plant *Cyperus involucratus*	full sun to partial shade	USDA Zones 8-11	2 to 6 feet	green/white
feather grass, Mexican needle grass *Nassella tenuissima*	full sun to partial shade	USDA Zones 7-11	2 to 3 feet	green/brown
sea oats, Chasmanthium paniculatum *Uniola paniculata*	full sun to partial shade	USDA Zones 6-10	3 to 6 feet	golden/brown
Cape lily, Powell's crinum lily *Crinum X powellii*	full sun to partial shade	USDA Zones 6-11	3 to 4 feet	white/pink
African iris, fortnight lily, morea iris *Dietes iridioides*	full sun to partial shade	USDA Zones 8-10	2 to 4 feet	white/purple
whirling butterflies, white gaura *Gaura lindheimeri*	full sun to partial shade	USDA Zones 5-10	2 to 4 feet	white/pink
daylily *Hemerocallis hybrids*	full sun to partial shade	USDA Zones 2-10	1 to 3.5 feet	various
Adam's needle, bear grass, weak-leaf yucca *Yucca filamentosa*	full sun	USDA Zones 5-10	3 to 5 feet	white
brome hummock sedge *carex bromoides*	full sun to partial shade	USDA Zones 2-10	1 ft	green

---

The Modular Wetland System - Linear® standard 22' long system will require 18 to 20 plants. Different size systems will require different plant quanitities; please contact us for detailed information.

The plants listed are tolerant to drought and have deep roots to allow for ehanced pollutant removal.

These plants are subject to availability in local areas. If you would like to use a different plant please contact us. We will work with you to ensure the chosen plants work with the projects current landscape theme.

The Modular Wetland System - Linear® should be irrigated like any other planter area. The plants in the system must receive adequate irrigation to ensure plant survival during periods of drier weather. As with all landscape areas the plants within the Modular Wetland System - Linear will require more frequent watering during the establishment period.

For more information please contact at: 760-433-7640 or email: info@modularwetlands.com

APPENDIX E

CONDITIONS OF APPROVAL

(PLACEHOLDER)

APPENDIX F

GEOTECHNICAL INFORMATION

EEI
Geotechnical & Environmental Solutions

GEOTECHNICAL EVALUATION

Shopoff Land Fund II, LP
Proposed Residential Development
HB-Seaside Magnolia
Magnolia Street & Banning Avenue
Huntington Beach, California

EEI Project No. SHO-72233.4a

February 17, 2016

Corporate Office: 2195 Faraday Avenue • Suite K • Carlsbad, California 92008-7207 • Ph: 760-431-3747 • Fax: 760-431-3748 •
www.eeitiger.com

GEOTECHNICAL EVALUATION

Prepared for:

Mr. Greg Vail
Shopoff Land Fund II, LP
2 Park Plaza, Suite 700
Irvine, California 92614

Subject Property Location:

Magnolia Street & Banning Avenue
Huntington Beach, California

Prepared by:

Maurice Amendolagine
GE 2746 (exp. 06/30/16)
Senior Geotechnical Engineer

Jeffrey P. Blake
CEG 2248 (exp. 10/31/17)
Principal Engineering Geologist

EEI
2195 Faraday Avenue, Suite K
Carlsbad, California 92008-7207

EEI Project No. SHO-72233.4a

TABLE OF CONTENTS

FIGURES

APPENDICES

Distribution: (1) Addressee (via electronic copy)

1.0 INTRODUCTION

1.1 Purpose

The purpose of this evaluation is to provide geotechnical information to Shopoff Land Fund II, LP, (hereinafter referred to as "Client") regarding the proposed HB-Seaside Magnolia development at Magnolia Street & Banning Avenue in Huntington Beach, California. The information in this evaluation is intended to provide the Client with an understanding of the physical conditions of site-specific subsurface soils, groundwater, and the regional geologic setting which could affect the cost or design of the proposed development (Site Vicinity Map-**Figure 1**, Aerial Site Map-**Figure 2**).

This Geotechnical Evaluation has been conducted in general accordance with accepted geotechnical engineering principles and in general conformance with the approved proposal and cost estimate for the project by EEI, dated December 7, 2015.

EEI conducted an onsite field exploration on January 14 and 15, 2016 that included drilling 5 hollow stem auger (HSA) geotechnical borings and advancing 14 cone penetration tests. This Geotechnical Evaluation has been prepared for the sole use of the Client. Other parties, without the express written consent of EEI and the Client, should not rely upon this geotechnical study.

1.2 Project Description

Development plans have not yet been finalized or submitted for review to the City of Huntington Beach or the California Coastal Commission. However, based on discussions with you, a conceptual land use program prepared by KTGY Group, Inc., dated October 21, 2015, and a conceptual grading plan prepared by Fuscoe Engineering, dated December 11, 2015, we understand that the future development may include a mix of uses including visitor-serving commercial such as a hotel, open space access and habitat protection corridors, detached and attached residential, and a creative campus and high technology office park. Buildings up to six stories in height are being considered. 100-year flood and year 2100 sea level rise protection measures may require import of soil to raise the property up to an elevation of 16.5 feet, NAVD 88.

We understand that CDP-10-11 provides for the demolition of the existing tank farm and leveling of the subject property within the containment berms. Prior to any development approvals or construction, we understand that demolition and leveling will be implemented through demolition and grading permits issued by the City of Huntington Beach.

We further understand that it is anticipated that AES, through agreement with the landowner, will submit an application for preparation of the property for construction staging connected with the reconstruction of their adjacent Huntington Beach Generating Facility. This application will include a new entrance to the property at the Magnolia-Banning intersection, and onsite parking and laydown facilities. The grading for this staging area is anticipated to include fills of approximately 5 feet and construction of a desilting basin. The grading for the construction staging is referred to as "interim grading" throughout the remainder of this report.

1.3 Scope of Services

The scope of our services included:

- A review of readily available data pertinent to the subject property, including published and unpublished geologic reports/maps, and soils data for the area (**References**).

- Conducting a geotechnical reconnaissance of the subject property and nearby vicinity.

- Coordination with Underground Service Alert to identify the presence of underground utilities for clearance of proposed borings.

- The drilling and logging of five (5) hollow stem auger (HSA) borings within the footprint of the proposed development to depths of approximately 36½ to 51½ feet below ground surface (bgs). The approximate locations of the borings are presented on **Figure 3** (Exploration Map).

- Advancing fourteen (14) cone penetration tests (CPTs) within the footprint of the proposed development to depths of approximately 50 to 80 feet below ground surface (bgs). The approximate locations of the CPT soundings are presented on **Figure 3** (Exploration Map).

- Laboratory testing of representative earth materials encountered onsite to ascertain their pertinent soils engineering properties, including corrosivity (**Appendix B**).

- An evaluation of seismicity and other geologic hazards such as faulting and liquefaction potential (**Appendix C**).

- An evaluation of slope stability (**Appendix D**).

- The preparation of this report which presents our findings, conclusions, and recommendations.

2.0 BACKGROUND

2.1 Property Description

The subject property is located at the northwest corner of Magnolia Street and Banning Avenue, in the City of Huntington Beach, Orange County, California. The property has an approximate triangular shape, encompasses approximately 29-acres and is situated adjacent to the AES power plant to the west and the ASCON landfill site to the north. Magnolia Street borders the property to the east. Three large petroleum storage tanks are present on the property, as are surface pipelines and pumping appurtenant. Residential properties are present to the east and the Orange County Flood Control Channel (Huntington Channel) and an undeveloped marshland is present immediately to the west. The property is located a short distance from Highway 1 and the Pacific Ocean to the southwest.

The petroleum storage tanks have a diameter of approximately 300 feet, a height of approximately 40 to 50 feet, and storage capacity of approximately 20 million gallons. The storage tanks are located in basins, approximately 5 to 6 feet deep which are bounded by earthen berms. The basin elevations range from about 4 feet, Mean Sea Level (MSL) to 6 feet MSL, and the crest of the earthen berms range from about 10 feet, MSL to 12 feet MSL. The crest of the berms are surfaced with asphalt concrete pavement.

The subject property is approximately situated at 33.645039° north latitude and -117.97308° west longitude (Google Earth®, 2015).

2.2 Previous Geotechnical Studies

EEI performed a cursory review of boring logs and a soil profile, apparently performed for construction of the Huntington Channel sheet pile wall on the west side of the subject property (Orange County Public Facilities and Resources Department, 2002).

Logs of four (4) hollow stem auger borings extending to depths ranging from of 35.5 feet and 41.5 feet have been provided to us. We have used the information contained in the boring logs as background information.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

3.1 Field Exploration

Field work for our Geotechnical Evaluation was conducted on January 14 and 15, 2016. Five (5) hollow stem auger borings and fourteen (14) CPT soundings were performed. The approximate locations of the borings and CPT soundings are shown on **Figure 3**.

Auger Borings- The five (5) exploratory borings extended to depths of approximately 36½ to 51½ feet below the existing ground surface and were logged and sampled under the supervision of a geologist with EEI. Refusal due to running/heaving sands was encountered at borings B2 and B4 at depths of approximately 36½ feet, and 26½ feet, respectively. Blow count (N) values were determined utilizing a 140 pound auto-hammer falling 30-inches onto a Standard Penetration Test (SPT) split-spoon sampler and a Modified California split-tube sampler. A truck mounted hollow stem auger (HSA) drill rig was used to advance the borings. The blows per 6-inch increment required to advance the 18-inch long SPT and 18-inch long Modified California split-tube samplers was measured at various depth intervals (varying between 2 to 5 feet), or at changes in lithology, recorded on the boring logs, and are presented in **Appendix A**-Soil Classification Chart and Boring Logs. Energy-corrected SPT N_{60} values are also presented on the borings logs.

Relatively "undisturbed" samples were collected in a 2.42-inch (inside diameter) California Modified split-tube sampler for visual examination and laboratory testing. Undisturbed samples were collected in 3-inch diameter Shelby tubes. Representative bulk samples were also collected for laboratory testing. The soils were classified in accordance with the Unified Soil Classification System (ASTM, 2008).

CPT Soundings - The CPT soundings were performed by Middle Earth Geo Testing Inc., under the supervision of a representative of EEI. CPT testing was conducted in general accordance with ASTM Test Method D3441. The CPT procedure includes pushing an electronic cone penetrometer, which records data including tip resistance, sleeve friction and dynamic pore pressure as it is advanced. A 25-Ton CPT rig equipped with a 10 square centimeter cone was used to conduct the CPT soundings. Thirteen CPTs were pushed to a depth of approximately 50 feet. One CPT (CPT-5) was pushed to refusal at a depth of approximately 80 feet bgs. Shear wave velocity measurements were intended to be performed at 10-foot intervals in the 80-foot deep CPT (CPT-5). Technical problems with the CPT equipment prevented all of the intended data from being obtained. Pore-water dissipation tests were performed at selected locations to evaluate the depth of the groundwater table at the time the CPTs were pushed. CPT data are presented in **Appendix A**.

3.2 Laboratory Testing

Selected samples obtained from our borings were tested to evaluate pertinent soil classification and engineering properties and enable development of geotechnical conclusions and recommendations. The laboratory tests included:

- Grain Size Distribution
- Corrosivity
- Atterberg Limits
- Expansion Index

- In Situ Moisture and Density
- Direct Shear
- Consolidation

The results of the laboratory tests, and brief explanations of test procedures, are presented in **Appendix B**. It should be understood that the results provided in **Appendix B** are based upon pre-development conditions. Verification testing is recommended at the conclusion of grading on samples collected at or near finish grade.

4.0 GEOLOGIC SETTING AND SUBSURFACE CONDITIONS

4.1 Geologic Setting

The subject property lies within the northwest portion of the Peninsular Ranges geomorphic province of California. The Peninsular Ranges geomorphic province, one of the largest geomorphic units in western North America, extends from the Transverse Ranges geomorphic province and the Los Angeles Basin, south to Baja California. It is bound on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province. The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks (CGS, 2010). Major fault zones and subordinate fault zones found in the Peninsular Ranges Province typically trend in a northwest-southeast direction.

Regional geologic maps of the property and vicinity (published by the California Geological Survey and USGS) indicate that the subject property is underlain by Holocene age Eolian Deposits (Qe), Fan Deposits (Qyf), and Alluvium (Qya).

4.2 Subsurface Conditions

The materials encountered in our exploratory borings and CPTs consist of undocumented fill and Quaternary age Young Axial Channel Deposits (Qya).For reporting purposes, these units have not been differentiated, and have been grouped into Young Axial Channel Deposits (Qya). A brief description of the subsurface conditions is provided in this section. Detailed descriptions of the subsurface conditions are provided on the boring and CPT logs included in **Appendix A**.

Undocumented Fill - Undocumented fill (fill) was encountered in all of the borings performed. The fill consists of very moist, grey-brown silty clay (Unified Soil Classification System symbol: CL-ML), elastic silt (MH), and sandy silt with clay (CL). The fill was loose and very soft to stiff. The fill encountered was present from ground surface, and extends to a depth of approximately 2½ feet relative to the basin elevations of approximately 4 to 6 feet, MSL. The fill thickness relative to the top of the existing berms is likely on the order of approximately 8 feet. We are not aware of any documentation of the fill placement. Therefore, the fill is considered undocumented.

Young Axial Channel Deposits - Quaternary Young Axial Channel Deposits (Qya) were encountered in all of our borings and extend to the maximum depths explored. This material consists of an upper layer of clay/silty-clay/elastic silt/silt (CL/CL-ML/MH/ML), and an underlying layer of silty sand (SM), sandy silt (ML), and poorly graded sand with silt (SP-SM). The upper layer of clay/silty-clay/elastic silt/silt extends from depths of approximately 2½ feet to 7½ feet below ground surface (relative to the basin elevations at approximately 4 to 6 feet, MSL). The underlying sand/silt layer extends from a depth of approximately 7½ feet to the maximum depth explored (relative to the basin elevations at approximately 4 to 6 feet, MSL).

The upper layer of clay/silty-clay/elastic silt/silt is dark gray-brown to brownish-gray with orange mottling, very soft to stiff, very moist to saturated, and contains calcium carbonate stringers.

The underlying sand/silt layer is dark gray, wet, and loose to very dense. The underlying sand/silt layer contains marine shell fragments.

4.3 Groundwater

Groundwater was encountered at depths ranging between approximately 5 to 7 feet in the borings performed at the subject property, and approximately 1-foot to 9 feet in the CPT's. According to the Seismic Hazard Zone Report for the Anaheim and Newport Beach 7.5' quadrangle (CDMG, 1997), the depth to historically high groundwater is 3 feet bgs in the vicinity of the property.

It should be noted that variations in groundwater may result from fluctuations in the ground surface topography, subsurface stratification, precipitation, irrigation and other factors that may not have been evident at the time of our subsurface exploration.

5.0 GEOLOGIC HAZARDS

5.1 California Building Code Seismic Design Parameters

A geologic hazard likely to affect the project is ground-shaking as a result of movement along an active fault zone in the vicinity of the subject property. The 2013 California Building Code seismic parameters are presented in **Table 1**.

Table 1
2013 CBC Seismic Parameters and Peak Ground Acceleration

Parameter	Value
Site Coordinates	Latitude 33.645039° Longitude -117.97308°
Mapped Spectral Acceleration Value at Short Period: $\mathbf{S_s}$	1.623g
Mapped Spectral Acceleration Value at 1-Second Period: $\mathbf{S_1}$	0.602g
Site Classification	D[1]
Short Period Site Coefficient: $\mathbf{F_a}$	1.000
1-Second Period Site Coefficient: $\mathbf{F_v}$	1.500
Design Spectral Response Acceleration at Short Periods: $\mathbf{S_{DS}}$	1.082g
Design Spectral Response Acceleration at 1-Second Period: $\mathbf{S_{D1}}$	0.602g
Peak Ground Acceleration adjusted for Site Class Effects: $\mathbf{PGA_M}$	0.651g

1. Based on ground improvement of liquefiable material

5.2 Faulting and Surface Rupture

The subject property is located within an area of California known to contain a number of active and potentially active faults. The property is not located within a State of California Earthquake Fault Zone (CDMG, 1986). Three of the closest faults along with their distance from the property and Maximum Magnitude are shown in **Table 2.**

Table 2
Nearby Active Faults

Fault	Distance in Miles (Kilometers)[1]	Maximum Magnitude[1]
Thums - Huntington Beach Fault (Northern)	1.3 (2.1)	6.6
Newport Inglewood Fault Zone South Los Angeles Basin (Southern Section)	1.7 (2.7)	7.2
San Joaquin Hills	3.2 (5.2)	7.0

1. Caltrans ARS Online

According to the United States Geological Survey (USGS), the South Branch of the Newport-Inglewood Fault crosses the central portion of the subject property in a northwest-southeast direction. The South Branch of the Newport-Inglewood Fault is not considered active. However, the South Branch fault trace is classified by the City of Huntington Beach as a Category C fault, which requires special studies, including a subsurface investigation for critical and important land use.

Due to the presence of a layer of fill and shallow groundwater, conventional fault trenching and logging was not feasible to evaluate the presence of faulting and potential ground rupture. In lieu of trenching, and as an option consistent with the scope of the evaluation, the data from the CPT soundings and the hollow stem auger borings were used to correlate stratigraphic units in order to evaluate and check for the presence of the South Branch fault segment and the potential for surface fault rupture. As indicated on **Figure 3**, three selected pairs of CPT soundings were located on either side of the postulated northwest-southeast trending South Branch fault at 3 locations in order to evaluate changes in stratigraphy that may be indicative of a fault and fault offset. The three pairs of CPT soundings specifically used for this purpose included CPT-1 and CPT-2, CPT-6 and CPT-7, and CPT-10 and CPT-11. Based on the stratigraphic data from the CPT soundings, the upper clay/silt layer from approximately 0 to 8 feet, and the underlying sand/silt are relatively continuous. This continuity in stratigraphy is also apparent in borings B-2, B-3 and B-5. Based on the overall continuity of the stratigraphic layers observed in the CPT soundings and the hollow stem auger borings, no evidence of onsite faulting was apparent. Therefore, we consider that the potential for surface ground fault rupture is low.

5.3 Static Landslides and Slope Stability

Evidence of static landslides or slope instabilities were not observed at the subject property. Due to the site topography and the absence of nearby slopes or hills, the potential for static landslides or slope instabilities to occur at the property is considered low. Seismically induced instability and lateral deformations are discussed in the following sections.

5.4 Expansive Soil

Laboratory test results indicate the some of the near surface onsite soils are moderately expansive. The expansion potential of these materials are not considered to pose a hazard for the proposed development since they will be located at least 10 feet below finished grade, improved, or removed.

5.5 Liquefaction and Dynamic Settlement

Liquefaction occurs when loose, saturated, sands and silts are subjected to strong ground shaking. The strong ground shaking causes pore-water pressure to rise, soils lose shear strength and become liquid; potentially resulting in large total and differential ground surface settlements as well as possible lateral spreading during an earthquake.

EEI reviewed readily available and relevant maps and publications regarding liquefaction potential at the subject property. According to the Seismic Hazard Zone Map for the Anaheim and Newport Beach 7.5' quadrangle (CDMG, 1997), the property is located within a liquefaction zone and in a zone of required investigation to evaluate the potential for liquefaction.

The liquefaction potential was evaluated using the CLiq computer program (Geologismiki, 2015) using the CPT data. Our evaluation was based on the site class adjusted peak ground acceleration of 0.651g, as presented in **Table 1**, a probabilistic 2,475 year modal magnitude of 7.0, and a finished grade elevation of 16.5 feet MSL. Our evaluation indicates some of the soil layers below a depth of approximately 7 feet are potentially liquefiable. Given the various uncertainties and simplifying assumptions used in the evaluation, we estimate total seismic-induced settlement will vary between approximately 0- to 2-inches across the property.

A discussion of options for mitigation of seismically-induced settlement are provided in this report. The results of the liquefaction analysis are provided in **Appendix C**. Estimates of seismic settlement (saturated and unsaturated) at each of the CPT sounding locations are provided in the following **Table 3**.

Table 3
Estimated Seismic Settlement

CPT Sounding	Estimated Seismic Settlement (inches)
CPT-1	1.0
CPT-2	0.9
CPT-3	1.2
CPT-4	1.4
CPT-5	0.2
CPT-6	0.8
CPT-7	0.5
CPT-8	0.4
CPT-9	0.4
CPT-10	0.5
CPT-11	0.3
CPT-12	0.9
CPT-13	0.5
CPT-14 (Performed on existing berm)	0.3

5.6 Lateral Spreading/Seismic Slope Stability

Lateral spreading/seismic stability has been evaluated using the SLIDE 7.0 (Rocscience, 2016) computer program. Two cross sections were evaluated; one across the western property line (A-A'), and one across the eastern property line (B-B'). These cross-sections are presented in Appendix D. The soil parameters and geometry used in the stability evaluations are considered relatively representative of the typical conditions across the east and west property lines. We understand a landfill exists on the property to the north and that closure activities are currently in progress. We currently do not have the necessary information that would be needed to perform stability evaluations at this location. Evaluations should be performed at this area in the future when sufficient information is available.

The evaluation of lateral spreading/seismic slope stability represents the stability of the slope after earthquake shaking stops. This analysis uses dynamic shear strengths without seismic loading. The factor of safety obtained for the lateral spreading/seismic stability evaluation was approximately 1.8 for the west side of the property, and 1.2 for the east side of the property. Factors of safety higher than 1.3 are typically considered indicative of acceptable post-earthquake stability.

However, relatively large displacements can still occur during earthquake shaking even when post-earthquake stability is deemed acceptable (see following section). The following simplifying assumptions and modeling techniques have been used in our evaluation of lateral spreading/seismic stability:

- We understand that the final site grade will be at elevation 16.5 feet MSL, however, grading plans have not yet been developed. For our evaluation at the west side of the subject property (Section A-A'), we have assumed a 3:1 (H:V) ascending slope will extend from the western property line, up to elevation 16.5 feet MSL as shown in the slope stability cross-sections in **Appendix D**. For our evaluation at the east side of the property (Section B-B'), we have assumed a gentle ascending slope will extend from the eastern property line, up to elevation 16.5 feet MSL as shown in the slope stability cross-sections in **Appendix D**.
- We have assumed that the fill placed to raise site grades will consist of well compacted, predominantly granular fill.
- We have assumed that the subsurface conditions encountered on the site extend laterally to the east and west and beyond the subject property lines.
- The geometry of the Huntington Beach Canal and sheet pile wall was obtained from plans provided to us. It should be understood that the geometry of the canal and the water level in the canal is dynamic and will change with time. The conditions assumed in the stability model may not be the same as those present during the design earthquake.
- The stabilizing effect of the sheet pile wall has been modeled in the slope stability software with a line load acting horizontally at the mud-line of the sheet pile wall. The magnitude of the line load is based on the anticipated available passive pressure on the waterside of the sheet pile wall with consideration of the submerged slope and the likely presence of liquefiable materials.

Based on the results of our evaluation, it is our opinion that there is a low potential for post-earthquake lateral spreading/seismic instability to occur on the west side of the project site (Section A-A'), and a high potential for post-earthquake lateral spreading/seismic instability to occur on the east side of the project site (Section B-B'). The results of the stability evaluation are provided in **Appendix D**.

5.7 Seismic Slope Displacement

The evaluation of seismic slope displacement estimates the displacement of a slope during earthquake shaking. The seismic slope displacement evaluation was performed using the same cross-sections, software, shear strengths, and simplifying assumptions and modelling techniques which were used for the lateral spreading/seismic stability evaluation as described above. However, a seismic coefficient was used iteratively to determine the yield acceleration (horizontal seismic coefficient for a factor of safety of 1.0) which is then compared with the design earthquake loading to evaluate seismic slope displacement.

Our evaluations indicates relatively large horizontal displacements, on the order of 3 to 4 feet, may occur on the west side of the subject property (Section A-A'), and 9 feet on the east side of the property (Section B-B') during earthquake shaking. While the mechanisms that produce lateral spreading/seismic stability versus seismic slope displacement are different, the effects on proposed improvements can be relatively similar where large displacements are predicted.

The estimates of seismic displacement should be considered an index of the expected seismic performance, rather than a "hard" displacement value. As discussed herein, a number of simplifying assumptions has been used in the evaluation. A discussion of options for mitigation of seismically-induced displacements are provided in this report. The results of the seismic slope displacement evaluations are provided in **Appendix D**.

5.8 Tsunamis, Flooding and Seiches

The subject property is located within a Tsunami Inundation Area (State of California, 2009); therefore, damage due to tsunamis is considered high.

EEI reviewed the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Map Number 06059C0263J, Panel 263 of 539, to determine if the subject property was located within an area designated as a Flood Hazard Zone. The property is within Zone AE described as a Special Flood Hazard Area Subject to Inundation by the 1 percent Annual Chance Flood.

Seiches are periodic oscillations in large bodies of water such as lakes, harbors, bays, or reservoirs. The subject property is located immediately adjacent to the Huntington Channel; therefore, there is potential for a seiche to affect the property.

5.9 Static Settlement

Static settlement of proposed improvements may occur as a result of consolidation of the upper soft clay/silt soils due to loading from the proposed site grading fill and the proposed structures. The upper soft clay/silt soils extend from the existing ground surface to a depth of approximately 8 feet. Long-term, total, consolidation settlement of the upper soft clay/silt soils due to proposed fill and building loads is estimated to vary between approximately 0- to 7-inches (without ground improvement).

The clay soils underlying the existing fuel tanks have been consolidated and will likely not consolidate any further due to proposed fill and building loads. Subsequently, differential settlement is likely to be an issue for proposed buildings and other improvements that span across the perimeter of the fuel tanks. Other areas of the subject property where the existing ground surface is relatively high such as the existing berms, and the area east of the basins (which we have not yet investigated), will generally settle less than the low lying areas within the petroleum tank basins. We understand that some interim grading is currently planned and that some basin areas will be loaded with up to approximately 6 feet of fill. Proposed buildings and other improvements constructed over these areas with differential loading history may also be subject to differential settlement. A discussion of options for mitigation of static settlement are provided in this report. Estimates of static total settlement at each of the CPT sounding locations are provided in **Table 4**.

Table 4
Estimated Total Static Settlement

CPT Sounding	Estimated Total Static Settlement (inches)
CPT-1	4.0
CPT-2	4.1
CPT-3	2.5
CPT-4	3.2
CPT-5	4.0
CPT-6	3.5
CPT-7	4.0
CPT-8	7.0
CPT-9	3.2
CPT-10	4.0
CPT-11	3.0
CPT-12	3.5
CPT-13	3.0
CPT-14 (Performed on existing berm)	1.2

6.0 CONCLUSIONS

Based on our field exploration, laboratory testing and engineering and geologic analysis, it is our opinion that the subject property is suitable for the proposed development from a geotechnical engineering and geologic viewpoint; however, there are existing geotechnical conditions associated with the property that warrant mitigation and/or consideration during planning stages. The main geotechnical conclusions for the project are presented in the following sections.

- The property is underlain by artificial, undocumented fill (fill) and Quaternary Young Alluvial Flood Plain Deposits (Qya). Relatively compressible clays soils exist within the upper approximately 8 feet below existing ground surface (relative to the basin bottom elevations) at some locations. Long-term, total, consolidation settlement of the clay soils due to proposed fill and building loads is estimated to vary between approximately 0- to 7-inches (without ground improvement).

  The clay soils underlying the existing fuel tanks have likely been fully consolidated by loading that exceeds the proposed fill and building loads, and will likely not consolidate any further due to proposed fill and building loads. Subsequently, differential settlement is likely to be an issue for proposed buildings and other improvements that span across the perimeter of the fuel tanks. Other areas of the subject property where the existing ground surface is relatively high such as the existing berms, and the area east of the basins (which we have not yet investigated), will generally settle less than the low lying areas within the petroleum tank basins. We understand that some interim grading is currently planned and that some basin areas will be loaded with up to approximately 5 feet of fill prior to final site grading. Proposed buildings and other improvements constructed over these areas with differential loading history may also be subject to differential settlement. A discussion of options for mitigation of static settlement are provided in this report.

- Groundwater was encountered as shallow as 1-foot below ground surface during our geotechnical evaluation. Groundwater was encountered between depths of approximately 1-foot below ground surface (relative to the basin elevations at approximately 4 to 6 feet, MSL), and 9 feet below ground surface (relative to the top of one of the berms).

- Some of the silty and sandy Quaternary Young Alluvial Flood Plain Deposits below depths of approximately 8 feet (relative to the basin elevations at approximately 4 to 6 feet, MSL) are considered to be highly susceptible to liquefaction. Total and differential liquefaction induced settlement is estimated to be on the order of approximately 2-inches, and 1-inch, respectively. Recommendations for mitigation of the liquefaction hazards are provided in this report.

- Due to the presence of the soft surficial clayey soil and the underlying silty/sandy liquefiable materials, it is our opinion that there is a moderate to high potential for relatively large seismic displacements to occur towards the Huntington Beach Canal on the west side of the subject property, and towards Magnolia Street on the east side of the property. These relatively large displacements have the potential to cause significant damage to proposed improvements following a significant seismic event. Recommendations for mitigation of the seismic displacement hazard are provided in this report.

- Ground improvement is considered necessary at this property in order to mitigate the effects of static settlement, seismic settlement, and seismic slope displacement. Various ground improvement methods are available. These ground improvement methods are discussed in this report.

- We understand a landfill exists on the property to the north and that closure activities are currently in progress. We currently do not have the necessary information that would be needed to perform stability evaluations at this location. Evaluations should be performed at this area in the future when sufficient information is available.

- The subject property is located within an area of California known to contain a number of active and potentially active faults. The property is not located within a State of California Earthquake Fault Zone (CDMG, 1986). According to the United States Geological Survey (USGS), the South Branch of the Newport-Inglewood Fault crosses the central portion of the property in a northwest-southeast direction. The South Branch of the Newport-Inglewood Fault is not considered active. However, the South Branch fault trace is classified by the City of Huntington Beach as a Category C fault, which requires special studies, including a subsurface investigation for critical and important land use. Based on the results of our evaluation at the property, no active fault traces were identified crossing the property and therefore, in our opinion, the likelihood of surface fault rupture should be considered low.

- The subject property is located within a Tsunami Inundation Area (State of California, 2009); therefore, damage due to tsunamis is considered high.

- The subject property is located within Zone AE described as a Special Flood Hazard Area Subject to Inundation by the 1 percent Annual Chance Flood.

- Portions of the subject property were not available for investigation for this report. These areas include the footprints of the large petroleum tanks, and the area between Magnolia Street and the primary containment berm. Additional field investigation should be performed in these areas after the petroleum tanks are removed. Accordingly, the recommendations in this report should be considered preliminary.

- If the potentially liquefiable materials are not densified or otherwise improved to a non-liquefiable condition, a seismic site class "F" will be applicable for the subject property and a Seismic Site Response analysis will be required to define the 2013 CBC seismic design parameters.

7.0 PRELIMINARY GROUND IMPROVEMENT RECOMMENDATIONS

The recommendations presented herein should be incorporated into the planning and design phases of development. Options to mitigate hazards relative to liquefaction and dynamic settlement, seismic slope displacement, and static settlement are provided in the following sections.

7.1 Ground Improvement Methods

Ground improvement is typically performed on a design-build basis by qualified specialty contractors. The specialty contractor designs the ground improvement in close coordination with the owner, and project team members including the geotechnical and structural engineer to meet agreed-upon performance criteria. The design-build submittal should be stamped by a California Registered Engineer.

Ground improvement options to mitigate the effects of static settlement, liquefaction induced settlement, and liquefaction induced lateral spreading/seismic slope displacement can be characterized as densification, reinforcement, mixing, or replacement. Some common ground improvement methods that may be considered at this site are briefly described in the following section (Martin and Lew, 1999, Hayward Baker, 2016).

- Deep dynamic compaction involves the use of impact energy on the ground surface to densify and compact subsurface soils. Weights typically ranging from 10 to 30 tons are lifted with standard, modified, or specialty machines and dropped from heights of about 50 to 120 feet. Freefall impact energy is controlled by selecting the weight, drop height, number of drops per point and the spacing's of the grid. In general, treatment depths of up to 35 feet may be achievable in granular soils. If surficial saturated cohesive soils are present or the groundwater table is within 3 to 5 feet of the surface, a granular layer is often needed to limit the loss of impact energy and transfer the forces to greater depths. The major limitations of the method are vibrations, flying matter, and noise. For these reasons, work often requires 100 to 200 feet clearance from adjacent occupied buildings or sensitive structures.

- Vibro-replacement (also known as stone columns) is a technique used to mitigate liquefaction whereby a vibratory probe is inserted into the soil on a designated grid in order to densify the loose soil. As the probe is retracted at each location, gravel is placed as backfill into the void created by the probe. This procedure densifies the soil and ads rigidity to the soil. The stone columns are typically installed on a spacing of 6- to 10-foot centers to depths of 50 feet to 100 feet below ground surface. Vibro-replacement is generally effective in soils containing less than 15 to 20 percent fines.

- Rigid inclusions is a ground improvement technique that transfers loads through weak strata to a firm underlying stratum using high modulus, controlled stiffness columns. A bottom-feed mandrel with a top-mounted vibrator is advanced through the weak strata to the underlying firm stratum. Granular bearing soils are densified by displacement. A specific type of rigid inclusion is a Drilled Displacement Column (DDC).

- Rammed aggregate piers (RAP) are constructed by pre-drilling 24- to 30-inch diameter holes and backfilling the holes with aggregate in 12-inch lifts. As the lifts are placed, a beveled tamper rams and compacts the aggregate, densifying the aggregate, and forcing the aggregate laterally into the sidewalls of the hole. The RAP are typically installed on 7-foot centers to depths on the order of 25 to 30 feet. The technique has been used to increase bearing capacity and decrease settlement.

- Jet grouting is a grouting technique that creates in situ geometries of soilcrete (grouted soil), using a grouting monitor attached to the end of a drill stem. The jet grout monitor is advanced to the maximum treatment depth, at which time high velocity grout jets (and sometimes water and air) are initiated from ports in the side of the monitor. The jets erode and mix the in situ soil as the drill stem and jet grout monitor are rotated and raised. Jet grouting is effective in silts and most clay.

- Compaction grouting, also known as Low Mobility Grouting, is a grouting technique that displaces and densifies loose granular soils and reinforces fine grained soils. Typically, an injection pipe is first advanced to the maximum treatment depth. The low mobility grout is then injected as the pipe is slowly extracted in lifts, creating a column of overlapping grout bulbs. The expansion of the low mobility grout bulbs displaces surrounding soils. When performed in granular soil, compaction grouting increases the surrounding soils density, friction angle and stiffness. In all soils, the high modulus grout column reinforces the soils within the treatment zone. Compaction grouting has been used to increase bearing capacity, and decrease settlement and liquefaction potential. This method is typically most effective at depths greater than 10 feet.

- Deep soil-mixing is a technique involving mixing of cementitious materials using a hollow-stem auger and paddle arrangement. Gangs of 1 to 5 shafts with augers up to 3 feet or more in diameter are used to mix to depths of 100 feet or more.

As the augers are advanced into the soil, the hollow stems are used as conduits to pump grout and inject into the soil at the tip. Confining cells are created with the process as the augers are worked in overlapping configurations to form walls. Soft cohesive soils are usually targeted as other soil types can often be treated more economically with other techniques.

- Surcharging, also known as preloading is a technique used to reduce or eliminate post-construction static settlements. Preloading is the application of a surcharge load on the site prior to construction of the permanent structure, until most of the primary settlement has occurred. Since compressible soils are usually characterized by very low permeability, the time needed for the desired consolidation can be very long, even with a very high surcharge load.

  Therefore, the application of preloading alone may not be feasible with tight construction schedules and hence, a system of vertical wick drains can be used to achieve accelerated radial drainage and consolidation by reducing the length of the drainage paths.

- Wick drains, also known as Prefabricated Vertical (PV) drains and Vertical Strip Drains (VSD), consist of synthetic band-shaped material that is installed vertically into soft soils in order to accelerate preconstruction surcharging, also referred to as preloading. The drains are approximately 4-inches wide by ¼-inch thick and composed of a plastic strip with drainage channels, wrapped in a filter fabric.

  The installation of the drains is performed using vibratory hammers and/or static methods, and the wick drain layout typically consists of a triangular or square pattern.

7.2 Liquefaction and Dynamic Settlement Mitigation Options

As discussed in the previous sections, liquefaction induced total seismic settlements are estimated to vary between approximately 0- to 2-inches. Differential seismic settlements are estimated at approximately 1-inch over a distance of 40 feet. Provided static settlements can be adequately mitigated, it is our opinion that post-tensioned or heavily reinforced mat foundations combined with geogrid-reinforced fill can likely accommodate the estimated total and differential seismic settlements.

If the magnitude of combined static and seismic settlements cannot be accommodated by post-tensioned or heavily reinforced mat foundations combined with geogrid-reinforced fill, a ground improvement method such as rigid inclusions or Rammed Aggregate Piers (RAP) may be a suitable option to reduce seismic settlements.

7.3 Seismic Slope Displacement Mitigation Options

As discussed in the previous sections, relatively large seismic slope displacements are estimated along the west and east property line if ground improvement is not performed. We recommend ground improvement be performed to mitigate the seismic slope displacement hazard. The ground improvement should be designed to increase the shear strength of the upper clay soil (approximately 8 feet deep), and eliminate the liquefaction potential of the underlying sandy soil to a depth of approximately 20 feet below the existing ground surface. Our preliminary evaluation indicates a 25-foot wide zone of ground improvement would reduce seismic slope displacements to acceptable levels. The width of the zone would vary depending on the strength of the improved soil. We recommend the ground improvement be performed along the entire western and eastern property lines, a combined distance of approximately 3,500 feet.

In our opinion, the most suitable ground improvement method for strengthening both the liquefiable sandy soil and clayey soil consists of Deep Soil Mixing.

Based on our discussions with a local specialty ground improvement contractor (Hayward Baker), we understand that it would be more economical to excavate and dispose approximately half the volume of the existing upper soft clay as compared with treating it with soil mixing. The estimated unit cost for soil mixing provided by Hayward Baker is approximately $635.00 per lineal foot for the necessary ground improvement geometry described herein. The estimated unit cost for removal of the soft clay would be on the order of approximately $25.00 per cubic yard. We estimate that approximately 13,000 yd.^{3} of soft clay removal would be required. These cost estimates include costs associated with verification testing of the ground improvement.

7.4 Static Settlement Mitigation Options

As discussed in the previous sections, relatively compressible clay/silt soils exist within the upper approximately 8 feet below existing ground surface at some locations. Long-term, total, consolidation settlement of the clay soils due to proposed fill and building loads is estimated to vary between approximately 0- to 7-inches (without ground improvement).

Several mitigation options are available to reduce static, total and differential settlement as follows:

- Remove the upper approximately 8 feet of soft clay/silt soils and replace with compacted granular soil. Depending on the results of future investigations, removal of the clay/silt soils below the existing petroleum tanks (if present) and at other areas may not be necessary. The high groundwater table at the subject property would likely require a significant dewatering effort. Furthermore, we anticipate costs for excavation of saturated clayey/silty soil, disposal of saturated clayey soil, and replacement with granular fill will be relatively high. Accordingly, this option may be cost prohibitive.

- Surcharge (with stockpiled soil) to a height of approximately 15 to 20 feet above the final grade elevation. A static slope stability analysis will be necessary to evaluate the static stability of the preload geometry. We estimate approximately 2 to 4 months of surcharging would be required to adequately consolidate the existing soft clay/silt soils. Construction of a permeable drainage layer over the existing soft clay will shorten the required preload duration. The duration of the surcharge would be monitored with settlement gauges to determine when the surcharge could be removed. Depending on the results of future investigations, surcharging within the footprint of the existing petroleum tanks and other previously raised site areas may be reduced, or may not be necessary. Costs for hauling surcharge soil on and off the site and the duration of the surcharge should be considered when evaluating this option. It is our opinion that this is likely the most suitable option to reduce static settlements.

- Rigid inclusions may also be used to reduce static settlement. This method would include the construction of a gravel and geo-grid load transfer layer above the rigid inclusions. The estimated unit cost for rigid inclusions provided by Hayward Baker is approximately $10.00 per square foot.

8.0 PRELIMINARY GRADING RECOMMENDATIONS

The preliminary recommendations presented herein should be incorporated into the planning and design phases of development. Guidelines for site preparation, earthwork, and onsite improvements are provided in the following sections. Recommendations for site preparation and earthwork will be dependent on which ground improvement mitigation option is selected from the previous section. Accordingly, general guidelines for site preparation and earthwork are provided. Additional recommendations for site preparation and earthwork can be provided after the ground improvement mitigation option is selected.

8.1 General

Grading should conform to the guidelines presented in the 2013 California Building Code (CBC, 2013), as well as the requirements of the City of Huntington Beach and Orange County. Additionally, general Earthwork and Grading Guidelines are provided herein as **Appendix E**.

During earthwork construction, removals and reprocessing of soft or unsuitable fill materials, as well as general grading procedures of the contractor should be observed and the fill placed should be selectively tested by representatives of the geotechnical engineer, EEI. If any unusual or unexpected conditions are exposed in the field, they should be reviewed by the geotechnical engineer and if warranted, modified and/or additional recommendations will be offered. Specific guidelines and comments pertinent to the planned development are provided herein.

8.2 Site Preparation

Existing improvements, debris and other deleterious material, such as organic soils, tree root balls and/or environmentally impacted earth materials (if any) should be removed from the subject property prior to the start of grading. Areas to receive fill should be properly scarified and/or benched in accordance with current industry standards of practice and guidelines specified in the CBC (2013) and the requirements of the local jurisdiction.

Abandoned utilities should be removed from the subject property and the resulting trenches should be properly backfilled and tested. If unanticipated subsurface improvements (utility lines, septic systems, wells, utilities, etc.) are encountered during earthwork construction, the geotechnical engineer should be informed and appropriate remedial recommendations would then be provided.

The recommendations presented herein have been completed using the preliminary information provided to us regarding site development. Updated information concerning the proposed development should be provided to EEI for review so that we can determine if revisions are warranted.

8.3 Remedial Earthwork

The extent of remedial earthwork will generally depend on which ground improvement option is selected to mitigate the effects of static settlement, liquefaction induced settlement, and liquefaction induced lateral spreading/seismic slope displacement. Remedial earthwork for the various ground improvement options are provided in the following sections.

<u>Deep Soil Mixing for Mitigation of Seismic Displacement</u>

Remedial earthwork for the deep soil mixing ground improvement option should generally include removal and disposal of the upper approximate 4 feet of existing soft clay/silt soil within the ground improvement area. The deep soil mixing equipment can typically operate on the soft ground exposed at the base of the excavation.

<u>Remove and Replace Upper Soft Clay/Silt Soil for Static Settlement Mitigation</u>

If removal and replacement of the upper clay/silt soil is selected, dewatering wells will need to be installed around the perimeter of the subject property prior to excavation. Dewatering can cause adjacent ground settlement. A specialty contractor should be retained to design and perform the dewatering. The design should incorporate measures to ensure the dewatering does not induce settlement of adjacent improvements. After the property is sufficiently dewatered, the soft clayey/silty soil should be excavated and removed from the property. It is unlikely that the excavated soft clayey/silty soil can be reused as compacted fill due to its high moisture content.

The subgrade at the base of the excavation will likely require stabilization with gravel and geo-grid as discussed in the following section. Fill material and compaction procedures for the replacement soil should be performed in accordance with the recommendations in the following sections. Removals of undocumented fill onsite should be performed prior to construction of the proposed interim grading, to avoid double or triple handling of material.

Surcharge/Preloading for Static Settlement Mitigation

Removal of the approximate 2½-foot thickness of existing soft clay/silt fill soil which is present at ground surface below the bottom of the basins is not considered essential since removal of this material will likely cause an unstable ground condition. However, the existing berms and other areas of undocumented fill that overlie the existing clay/silt fill soil should be removed, typically down to the basin bottom elevations (approximately 4 to 6 feet, MSL).

Other areas which appear to contain undocumented fill are the areas between Magnolia Street and the primary petroleum tanks containment berm on the east side of the subject property. These areas have not yet been investigated. The presence of undocumented fill in these areas is based on their current elevations. As discussed previously, subsurface investigations should be performed in these areas and in the footprints of the existing petroleum tanks after they are removed from the property.

An approximate 1- to 2-foot thick permeable drainage layer should be constructed over the existing clay/silt fill soil to help shorten the required preload duration. The permeable drainage layer may consist of a well graded coarse sand and gravel. Depending on the gradation, a separation fabric may be needed to prevent migration of fines into the drainage layer. The drainage layer should be graded to one or more suitably designed drainage discharge locations capable of accepting and the anticipated water flows. Alternatively, a geomembrane may be used in lieu of the sand and gravel layer.

These removals of undocumented fill should be performed in conjunction with the proposed interim grading, to eliminate double or triple handling material.

Rigid Inclusions for Static Settlement Mitigation

Remedial earthwork for the rigid inclusion ground improvement option should include removal of undocumented fill with the exception of the approximate 2½-foot thickness of existing clay/silt fill as described herein.

8.4 Yielding Subgrade Conditions

The soils encountered at the subject property can exhibit "pumping" or yielding if they become saturated. This can often occur in response to periods of significant precipitation, such as during the winter rainy season. If this occurs and in order to help stabilize the yielding subgrade soils within the bottom of the removal areas, the contractor can consider the placement of stabilization fabric or geo-grid over the yielding areas, depending on the relative severity.

Mirafi 600X (or approved equivalent) stabilization fabric may be used for areas with low to moderate yielding conditions. Geo-grid such as Tensar TX-5 may be used for areas with moderate to severe yielding conditions. Uniform sized, ¾- to 2-inch crushed rock should be placed over the stabilization fabric or geo-grid. A 6- to 12-inch thick section of crushed rock will typically be necessary to stabilize yielding ground.

If significant voids are present in the crushed gravel, a filter fabric should be placed over the crushed gravel to prevent migration of fines into the gravel and subsequent settlement of the overlying fill.

Fill soils, which should be placed and compacted in accordance with the recommendations presented herein, should then be placed over the fabric or geo-grid until design finish grades are reached. The crushed gravel and stabilization fabric or geo-grid should extend at least 5 feet laterally beyond the limits of the yielding areas. These operations should be performed under the observation and testing of a representative of EEI in order to evaluate the effectiveness of these measures and to provide additional recommendations for mitigation, as necessary.

8.5 Fill Material and Placement

Unless noted otherwise, fill should be moisture conditioned to at least the optimum moisture content and compacted to at least 90 percent of the maximum dry density (based on ASTM D1557). Fill material within 4 feet of finished pad grade should possess a low expansion index (EI<50). Fill material should be free of organic matter (less than 3 percent organics by weight) and other deleterious material. Fill material should not contain rocks greater than 6-inches in maximum dimension, organic debris and other deleterious materials. Rock fragments exceeding 6-inches in one dimension should be segregated and exported from the subject property, or utilized for landscaping.

If import soils are needed, the earthwork contractor should ensure that all proposed fill materials are approved by the Geotechnical Engineer prior to use. Representative soil samples should be made available for testing at least ten (10) working days prior to hauling to the property to allow for laboratory tests.

Those areas to receive fill or surface improvements should be scarified at least 6-inches; moisture conditioned to at least 2 percent over optimum moisture content and re-compacted to at least 90 percent of the maximum dry density (based on ASTM D1557).

8.6 Shrinkage and Bulking

Several factors will impact earthwork balancing on the subject property, including shrinkage, bulking, subsidence, trench spoils from utilities and footing excavations, and final pavement section thickness as well as the accuracy of topography. Shrinkage, bulking and subsidence are primarily dependent upon the degree of compactive effort achieved during construction. Shrinkage, bulking and subsidence should be considered by the project civil engineer relative to final site balancing. It is recommended that the site development be planned to include an area that could be raised or lowered to accommodate final site balancing.

8.7 Temporary Site Excavations

It is anticipated that excavations in the onsite materials can be achieved with conventional earthwork equipment in good working order.

Temporary excavations within the on-site fill and formational materials (considered to be a Type B soil per OSHA guidelines) should be stable at 1H:1V inclinations for short durations during construction, and where cuts do not exceed 20 feet in height. Some sloughing of surface soils should be anticipated. Temporary excavations 3 feet deep or less can be made vertically.

The faces of temporary slopes should be inspected daily by the contractor's Competent Person before personnel are allowed to enter the excavation. Any zones of potential instability, sloughing or raveling should be brought to the attention of the Engineer and corrective action implemented before personnel begin working in the excavation.

Excavated soils should not be stockpiled behind temporary excavations within a distance equal to the depth of the excavation. EEI should be notified if other surcharge loads are anticipated so that lateral load criteria can be developed for the specific situation. If temporary slopes are to be maintained during the rainy season, berms are recommended along the tops of slopes to prevent runoff water from entering the excavation and eroding the slope faces.

8.8 Corrosivity

Two samples of the onsite soils were tested to provide a preliminary indication of the corrosion potential of the onsite soils. The test results are presented in **Appendix B**. A brief discussion of the corrosion test results is provided in the following text.

- The samples tested had soluble sulfate concentrations of 0.1 percent and 0.076 percent, which indicates the samples have a negligible to moderate sulfate corrosion potential relative to concrete. It should be noted that soluble sulfate in the irrigation water supply, and/or the use of fertilizer may cause the sulfate content in the surficial soils to increase with time. This may result in a higher sulfate exposure than that indicated by the test results reported herein. Studies have shown that the use of improved cements in the concrete, and a low water-cement ratio will improve the resistance of the concrete to sulfate exposure.

- The samples tested had chloride concentrations of 0.38 percent and 0.75 percent, which indicates the samples have a negligible chloride corrosion potential relative to metal.

- The samples tested had a minimum resistivity of 140 ohm-cm and 220 ohm-cm, which indicates the samples are severely corrosive to ferrous metals.

- The samples tested had a pH of 7.7 and 8.0, which indicates the samples are to moderately alkaline.

Additional testing should be performed after grading to evaluate the as-graded corrosion potential of the onsite soils. We are not corrosion engineers. A corrosion consultant should be retained to provide corrosion control recommendations if deemed necessary.

9.0 PLAN REVIEW

Once detailed grading and foundation plans are available, they should be submitted to EEI for review and comment, to reduce the potential for discrepancies between plans and recommendations presented herein. If conditions are found to differ substantially from those stated, appropriate recommendations will be provided. Additional field studies may be warranted.

10.0 LIMITATIONS

This Geotechnical Evaluation has been conducted in accordance with generally accepted geotechnical engineering principles and practices. Findings provided herein have been derived in accordance with current standards of practice, and no warranty is expressed or implied. Standards of practice are subject to change with time. This report has been prepared for the sole use of the Client, within a reasonable time from its authorization.

Subject property conditions, land use (both onsite and offsite), or other factors may change as a result of manmade influences, and additional work may be required with the passage of time.

This Geotechnical Evaluation should not be relied upon by other parties without the express written consent of EEI and the Client; therefore, any use or reliance upon this Geotechnical Evaluation by a party other than the Client should be solely at the risk of such third party and without legal recourse against EEI, its employees, officers, or directors, regardless of whether the action in which recovery of damages is brought or based upon contract, tort, statue, or otherwise. The Client has the responsibility to see that all parties to the project, including the designer, contractor, subcontractor, and building official, etc. are aware of this report in its complete form. This report contains information that may be used in the preparation of contract specifications; however, the report is not designed as a specification document, and may not contain sufficient information for use without additional assessment. EEI assumes no responsibility or liability for work or testing performed by others. In addition, this report may be subject to review by the controlling authorities.

11.0 REFERENCES

American Society of Civil Engineers (ASCE), 2010, Minimum Design Loads for Buildings and Other Structures, ASCE Document ASCE/SEI 7-10.

American Society for Testing and Materials (ASTM), 2008, Annual Book of ASTM Standards, Volume 04.08, Construction: Soil and Rock (I), Standards D 420 - D 5876.

Bray, J.D., and Sancio, R.B., 2006, Assessment of the Liquefaction Susceptibility of Fine-Grained Soils: American Society of Civil Engineers, Journal of the Geotechnical and Geoenvironmental Engineering, v. 132, n. 9, p. 1165-1177.

California Building Code (CBC), 2013, California Code of Regulations, Title 24, Part 2, Volume 2 of 2, California Building Standards Commission, Based on 2012 International Building Code; 2013 California Historical Building Code, Title 24, Part 8; effective January 1, 2014.

California Department of Conservation, Division of Mines and Geology (CDMG), 1986, Special Studies Zone, Newport Beach 7.5 Minute Quadrangle, Scale 1:24,000, Orange County, California, Effective July 1.

California Department of Conservation, Division of Mines and Geology (CDMG), 1997, Seismic Hazard Zone Report for the Anaheim and Newport Beach 7.5 Minute Quadrangle, Orange County, California, Seismic Hazard Zone Report 03.

California Division of Mines and Geology (CDMG), 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117, adopted March 13, 1997, revised and re-adopted September 11, 2008.

California Geological Survey (CGS), 2010, Fault Activity Map of California

California Geological Survey (CGS), 2010, Note 49, Guidelines for Evaluating the Hazard of Surface Fault Rupture.

Department of Water Resources (DWR), 2011, online water data library, (www.water.ca.gov/waterdatalibraryindex.cfm), Accessed February 3, 2016.

FEMA, 2009, Flood Insurance Rate Map 263 of 539, Panel 06059C0263J, Orange County, California, Effective December 3, 2009.

Fuscoe Engineering, 2015, Preliminary Interim Grading Map, Seller Responsibility Exhibit, Magnolia Street, Huntington Beach, California, December 11.

Google Earth®, 2015, Version 7.1.5.1557

Geologismiki Geotechnical Software, 2015, CPeT-IT CPT Interpretation Software, Version 1.6, dated 2015

Geologismiki Geotechnical Software, 2015, CLiq Liquefaction Software, Version 1.7, dated 2015

Hart, E.W., and Bryant, W.A. (Hart and Bryant), 1997, Fault-Rupture Hazard Zones in California: California Department of Conservation, Division of Mines and Geology, Special Publication 42.

Hayward Baker, 2016, online resources (www.haywardbaker.com), Accessed February 3, 2016.

Jennings, C.W., 1994, Fault Activity Map of California and Adjacent Areas: California Division of Mines and Geology (CDMG), Map Sheet No. 6, scale 1:750,000.

Jennings, C.W., and Bryant, W.A., 2010, 2010 Fault Activity Map of California, Geologic Data Map No. 6, dated 2010.

Ktgy Group, 2015, Conceptual Yield Study-Alternative 9, HB-Seaside Magnolia, Huntington Beach, California, October 21.

Martin, G., Lew, M., Arulmoli, K., Baez, J., Blake, T., Earnest, J., Gharib, F., Goldhammer, J., Hsu, D., Kupferman, S., O'Tousa, J., Real, C., Reeder, W., Simantob, A., & Youd, T. (1999). *Recommended Procedures For Implementation of DMG Special Publication 117 Guidelines for Analyzing and Mitigating Liquefaction Hazard in California*. Los Angeles, USA: The Southern California Earthquake Center.

Morton, D.M., and Miller, F.K., 2006, Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California: U.S. Geological Survey, Open-File Report OF-2006-1217, scale 1:100,000

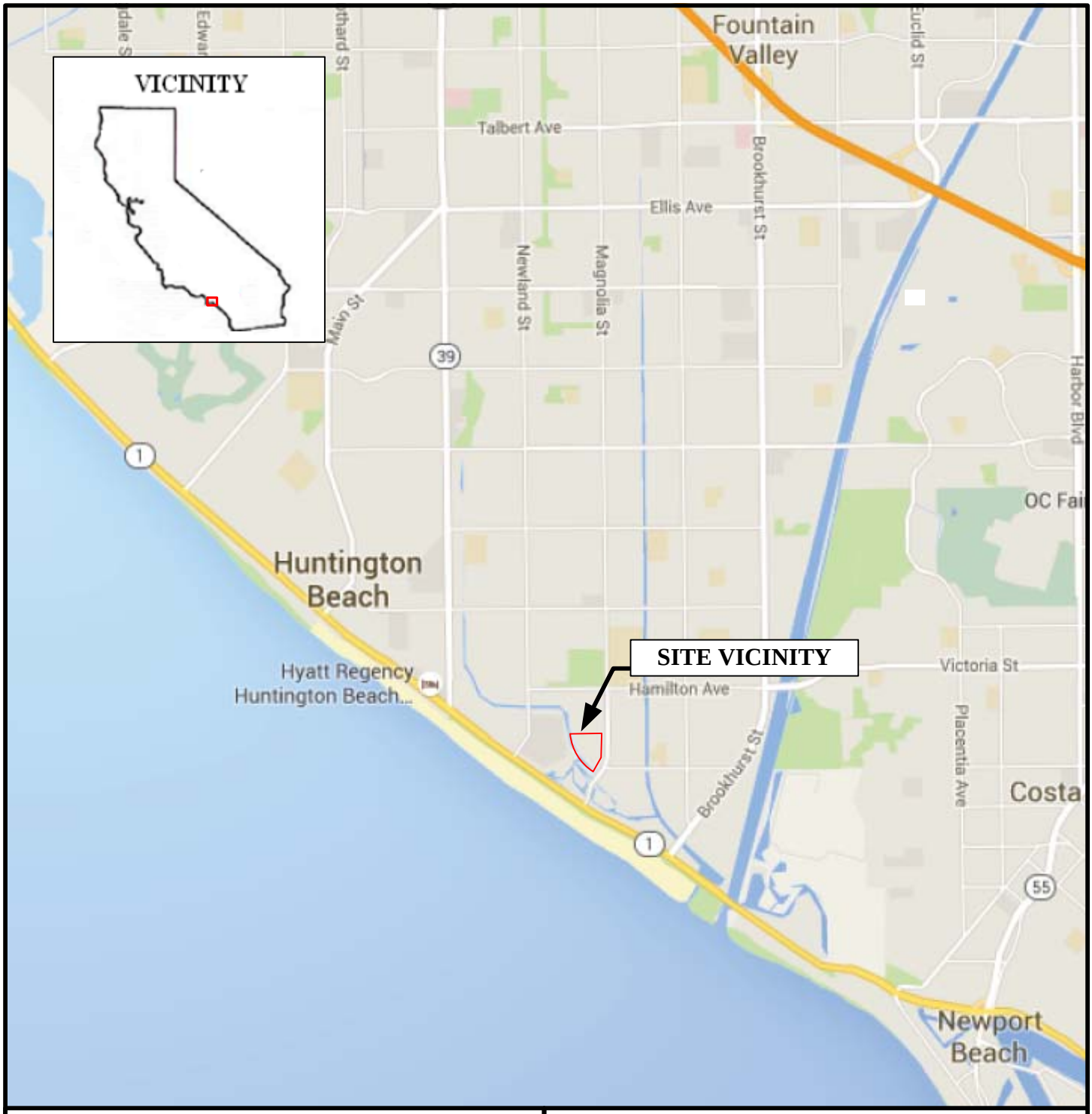
Orange County Public Facilities and Resources Department, 2002, Plans for Construction of Huntington Beach Channel (D01), Huntington Beach, California, April.

State of California, 2009, Tsunami Inundation Map for Emergency Planning, Newport Beach Quadrangle, Orange County; produced by California Emergency Management Agency, California Geological Survey, and University of Southern California – Tsunami Research Center; dated March 15, 2009, mapped at 1:24,000 scale.

State Water Resources Control Board, Website, GeoTracker database (http://www.geotracker.swrcb.ca.gov/), Accessed January 2016.

T.L. Youd, et.al., 2001, "Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils", American Society of Civil Engineers, Journal of Geotechnical and GeoEnvironmental Engineering, Vol. 127, No. 10, pp. 817-833.

FIGURES



LEGEND

N

Scale: 1" = 1mi

0 1mi 2mi

Note: All Locations Are Approximate

SITE VICINITY MAP

Shopoff Land Fund II, LP

HB - Seaside Magnolia

Magnolia Street & Banning Avenue
Huntington Beach, CA
EEI Project No. SHO-72233.4a
Created February 2016

EEI Geotechnical & Environmental Solutions

FIGURE 1

Map Source: Google Maps®; Accessed 2016

LEGEND

N

Scale: 1" = 300'

0 300 FT 600 F

Note: All Locations Are Approximate

AERIAL SITE MAP

Shopoff Land Fund II, LP

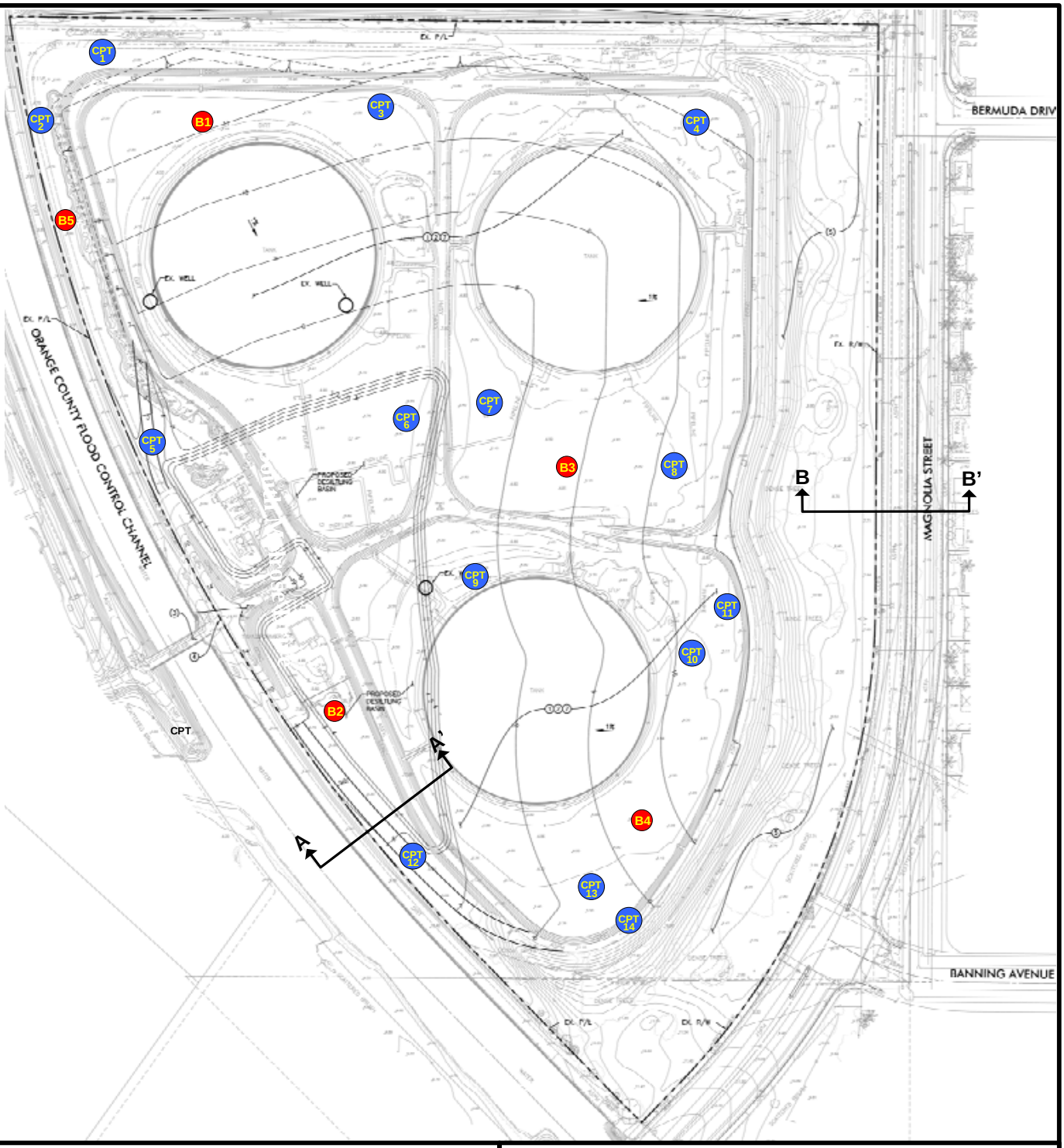
HB - Seaside Magnolia

Magnolia Street & Banning Avenue
Huntington Beach, CA
EEI Project No. SHO-72233.4a
Created February 2016

EEI Geotechnical & Environmental Solutions

FIGURE 2

Source: Google Earth, 2016; Image Date: January 18, 2016



LEGEND

B5 Approximate HSA Boring Locations

CPT 14 Approximate CPT Locations

A — A' Cross-Section Location

Scale: 1" = 200'

0 200 FT 400 FT

N

Note: All Locations Are Approximate

EXPLORATION MAP

Shopoff Land Fund II, LP

HB - Seaside Magnolia

Magnolia Street & Banning Avenue

Huntington Beach, CA

EEI Project No. SHO-72233.4a

Created February 2016

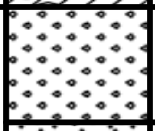
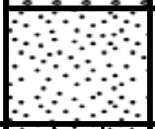
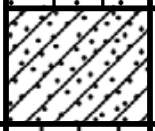
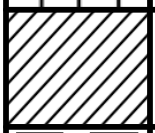
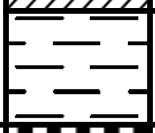
EEI Geotechnical & Environmental Solutions

FIGURE 3

Source: Fuscoe Engineering, Preliminary Site Plan, Magnolia Street, Huntington Beach, Ca. dated 12/11/2015

APPENDIX A
SOIL CLASSIFICATION CHART AND BORING AND CPT LOGS

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SEIVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION REATINED ON NO. 4 SEIVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS,GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY-SANDS, SAND – SILT MIXTURES
				SC	CLAYEY SANDS, SAND – CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

BORING NUMBER B-1

CLIENT Shopoff Land Fund II, LP
PROJECT NAME HB-Seaside Magnolia
PROJECT NUMBER SHO-72233.4
PROJECT LOCATION Magnolia St. & Banning Ave., Huntington Beach, CA
DATE STARTED 1/14/16 **COMPLETED** 1/14/16
GROUND ELEVATION 4.5 feet **BORING DIAMETER** 6-inch
EQUIPMENT / RIG L-10-T Track Rig
HAMMER EFFICIENCY (%) 68
METHOD 140 lb Auto Hammer
SPT CORRECTION 1.13 **CAL CORRECTION** 0.62
LOGGED BY BM **CHECKED BY**
GROUNDWATER DEPTH (ft) 5
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	USCS SYMBOL	SAMPLE TYPE	PENETRATION RESISTANCE (blows/6-inches)	SPT N60	POCKET PEN (tsf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (PI:LL)	FINES CONTENT (%)	OTHER TESTS
0		**FILL**										
1		SILTY-CLAY, dark gray-brown, very moist, soft	CL-ML									
2				BULK								
3		**YOUNG AXIAL CHANNEL DEPOSITS**		SPT	1 2 1	3		49				
4		@ 2.5' CLAY, brownish-gray and orange mottled, very moist to wet, soft; calcium carbonate stringers	CL									
5		▼										
6		@ 5' SILTY-CLAY, dark gray-brown, wet, soft; groundwater encountered; push with spt sampler	CL-ML	SPT	P P P	0						
7												
8		@ 7.5' SILTY-SAND, dark gray, very fine grained, wet, loose; common marine shell fragments		SPT	2 2 3	6						
9												
10				SPT	3 4 4	9						
11			SM									
12												
13												
14												
15		@ 15' SAND, dark gray fine to medium grained, trace silt, medium dense; trace marine shell fragments		SPT	4 8 13	24					3	SA
16												
17			SP									
18												
19												
20		@ 20' SILTY-SAND, dark gray, very fine grained, wet, loose; abundant marine shell fragments		SPT	8 11 13	27					19	WS
21												
22												
23												
24												
25		@ 25' Becomes dense		SPT	6 13 15	32						
26			SM									
27												
28												
29												
30		@ 30' Decrease to trace marine shell fragments		SPT	3 14 27	46						
31												

GEOTECH LOG - COLUMNS BORING LOGS.GPJ GINT STD US LAB.GDT 2/17/16

(Continued Next Page)

BORING NUMBER B-1

CLIENT Shopoff Land Fund II, LP **PROJECT NAME** HB-Seaside Magnolia

PROJECT NUMBER SHO-72233.4 **PROJECT LOCATION** Magnolia St. & Banning Ave., Huntington Beach, CA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	USCS SYMBOL	SAMPLE TYPE	PENETRATION RESISTANCE (blows/6-inches)	SPT N60	POCKET PEN (tsf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (PI:LL)	FINES CONTENT (%)	OTHER TESTS
32		@ 20' SILTY-SAND, dark gray, very fine grained, wet, loose; abundant marine shell fragments*(continued)*										
33												
34												
35		@ 35' No sample recovered		NR	10 23 33	35						
36												
37												
38												
39												
40				SPT	10 17 25	48						
41												
42			SM									
43												
44												
45				SPT	11 19 22	46						
46												
47												
48												
49												
50				SPT	5 13 24	42						
51												

Total depth: 51.5-feet
Groundwater encountered @ 5-feet
Boring backfilled with bentonite grout

BORING NUMBER B-2

CLIENT Shopoff Land Fund II, LP
PROJECT NAME HB-Seaside Magnolia
PROJECT NUMBER SHO-72233.4
PROJECT LOCATION Magnolia St. & Banning Ave., Huntington Beach, CA
DATE STARTED 1/14/16 **COMPLETED** 1/14/16
GROUND ELEVATION 5 feet **BORING DIAMETER** 6-inch
EQUIPMENT / RIG L-10-T Track Rig
HAMMER EFFICIENCY (%) 68
METHOD 140 lb Auto Hammer
SPT CORRECTION 1.13 **CAL CORRECTION** 0.62
LOGGED BY BM **CHECKED BY**
GROUNDWATER DEPTH (ft) 6
NOTES

DEPTH (ft)	MATERIAL DESCRIPTION	USCS SYMBOL	SAMPLE TYPE	PENETRATION RESISTANCE (blows/6-inches)	SPT N60	POCKET PEN (tsf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (PI:LL)	FINES CONTENT (%)	OTHER TESTS
0	**FILL**										
1	SANDY-SILT with CLAY, mixed brown, very moist, loose	ML									
2			BULK								COR
3	**YOUNG AXIAL CHANNEL DEPOSITS**		SPT	5 4 4	9		46				
4	@ 2.5' CLAY, brownish-gray and orange mottled, very moist to wet, soft; calcium carbonate stringers	CL									
5	@ 5' SILTY-CLAY, dark gray-brown, wet, soft; shelby tube push										
6	@ 6' Groundwater encountered	CL-ML	SH	1300psi							CON DS
7											
8	@ 7.5' SILTY-SAND, dark gray, trace clay, very fine grained, wet, medium dense; common marine shell fragments		SPT	2 4 7	12						
9											
10	@ 10' Becomes loose; trace marine shell fragments		SPT	3 3 3	7						
11											
12											
13											
14											
15	@ 15' Becomes dense		SPT	7 10 17	31					14	WS
16											
17											
18											
19											
20	@ 20' Increase to abundant marine shell fragments	SM	SPT	8 13 19	36						
21											
22											
23											
24											
25	@ 25' No sample recovered; drill to 27' and re-sampled		NR	14 23 24	29						
26											
27			SPT	14 31 38	78						
28											
29											
30	@ 30' Decrease to trace marine shell fragments		SPT	5 17 27	50						
31											

GEOTECH LOG - COLUMNS BORING LOGS.GPJ GINT STD US LAB.GDT 2/17/16

(Continued Next Page)

BORING NUMBER B-2

CLIENT Shopoff Land Fund II, LP **PROJECT NAME** HB-Seaside Magnolia

PROJECT NUMBER SHO-72233.4 **PROJECT LOCATION** Magnolia St. & Banning Ave., Huntington Beach, CA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	USCS SYMBOL	SAMPLE TYPE	PENETRATION RESISTANCE (blows/6-inches)	SPT N60	POCKET PEN (tsf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (PI:LL)	FINES CONTENT (%)	OTHER TESTS
32		@ 32" SILTY-SAND, dark gray, trace clay, very fine grained, wet, dense; common marine shell fragments	SM									
33												
34												
35		@ 35' No sample recovered		◯ NR	23 18 23	26						
36												

Total depth: 36.5-feet
Groundwater encountered @ 6-feet
Refusal while sampling; heaving sands
Boring backfilled with bentonite grout

BORING NUMBER B-3

CLIENT Shopoff Land Fund II, LP
PROJECT NAME HB-Seaside Magnolia
PROJECT NUMBER SHO-72233.4
PROJECT LOCATION Magnolia St. & Banning Ave., Huntington Beach, CA
DATE STARTED 1/15/16 **COMPLETED** 1/15/16
GROUND ELEVATION 5 feet **BORING DIAMETER** 6-inch
EQUIPMENT / RIG L-10-T Track Rig
HAMMER EFFICIENCY (%) 68
METHOD 140 lb Auto Hammer
SPT CORRECTION 1.13 **CAL CORRECTION** 0.62
LOGGED BY BM **CHECKED BY**
GROUNDWATER DEPTH (ft) 5
NOTES

DEPTH (ft)	MATERIAL DESCRIPTION	USCS SYMBOL	SAMPLE TYPE	PENETRATION RESISTANCE (blows/6-inches)	SPT N60	POCKET PEN (tsf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (PI:LL)	FINES CONTENT (%)	OTHER TESTS
0	**FILL**										
1	ELASTIC SILT, dark gray-brown, very moist, very soft	MH									
2			BULK						32:66	94	COR
3	**YOUNG AXIAL CHANNEL DEPOSITS**		SPT	1 1 1	2		59		28:65		
4	@ 2.5' ELASTIC SILT, brownish-gray and orange mottled, very moist to wet, very soft; calcium carbonate stringers										
5	▼	MH									
6			SH	1200psi			40		17:50		CON DS
7											
8	@ 7.5' SILTY-SAND, dark gray, very fine grained, wet, medium dense; abundant marine shell fragments		SPT	4 6 7	15					13	WS
9											
10			SPT	2 3 9	14						
11		SM									
12											
13											
14											
15	@ 15' SAND with SILT, dark gray, very fine grained, wet, dense; decrease to scattered marine shell fragments		SPT	6 11 16	31					9	SA
16											
17											
18											
19											
20			SPT	8 12 20	36						
21											
22											
23		SP-SM									
24											
25			SPT	9 16 22	43						
26											
27											
28											
29											
30	@ 30' Decrease to trace marine shell fragments		SPT	6 16 23	44						
31											

GEOTECH LOG - COLUMNS BORING LOGS.GPJ GINT STD US LAB.GDT 2/17/16

(Continued Next Page)

BORING NUMBER B-3

CLIENT Shopoff Land Fund II, LP **PROJECT NAME** HB-Seaside Magnolia

PROJECT NUMBER SHO-72233.4 **PROJECT LOCATION** Magnolia St. & Banning Ave., Huntington Beach, CA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	USCS SYMBOL	SAMPLE TYPE	PENETRATION RESISTANCE (blows/6-inches)	SPT N60	POCKET PEN (tsf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (PI:LL)	FINES CONTENT (%)	OTHER TESTS
32		@ 32' SILTY-SAND, dark gray, very fine grained, wet, dense; abundant marine shell fragments	SM									
33												
34												
35				SPT	4 12 26	43						
36												
37												
38												
39												
40				SPT	2 7 27	39						
41												
42												
43												
44												
45		@ 45' Becomes very dense		SPT	11 28 47	85						
46												
47												
48												
49												
50				SPT	16 30 46	86						
51												

Total depth: 51.5-feet
Groundwater encountered @ 5-feet
Boring backfilled with bentonite grout

BORING NUMBER B-4

CLIENT Shopoff Land Fund II, LP
PROJECT NAME HB-Seaside Magnolia
PROJECT NUMBER SHO-72233.4
PROJECT LOCATION Magnolia St. & Banning Ave., Huntington Beach, CA
DATE STARTED 1/15/16 **COMPLETED** 1/15/16
GROUND ELEVATION 5 feet **BORING DIAMETER** 6-inch
EQUIPMENT / RIG L-10-T Track Rig
HAMMER EFFICIENCY (%) 68
METHOD 140 lb Auto Hammer
SPT CORRECTION 1.13 **CAL CORRECTION** 0.62
LOGGED BY BM **CHECKED BY**
GROUNDWATER DEPTH (ft) 6
NOTES

DEPTH (ft)	MATERIAL DESCRIPTION	USCS SYMBOL	SAMPLE TYPE	PENETRATION RESISTANCE (blows/6-inches)	SPT N60	POCKET PEN (tsf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (PI:LL)	FINES CONTENT (%)	OTHER TESTS
0	**FILL**										
1	SILTY-CLAY, dark gray-brown, very moist, soft	CL-ML									
2			BULK								
3	**YOUNG AXIAL CHANNEL DEPOSITS**		SPT	1 2 2	5						
4	@ 2.5' CLAY, brownish-gray and orange mottled, very moist to wet, soft; calcium carbonate stringers	CL									
5											
6	@ 5' SILTY-CLAY, dark gray-brown, wet, soft; shelby tube push @6' Groundwater encountered at 6-feet	CL-ML	SH	1700psi							
7											
8	@ 7.5' SILTY-SAND, dark gray, very fine grained, wet, loose; abundant marine shell fragments	SM	SPT	2 3 6	10					28	WS
9											
10	@ 10' SAND with SILT, dark gray, very fine grained, wet, medium dense; trace marine shell fragments		SPT	1 4 6	11					8	SA
11											
12											
13											
14											
15	@ 15' Becomes dense		SPT	8 17 26	49						
16											
17											
18		SP-SM									
19											
20			SPT	7 14 29	49						
21											
22											
23											
24											
25			SPT	10 15 25	45						
26											

Total depth:26.5-feet
Groundwater encountered @ 6-feet
Refusal while sampling; heaving sands
Boring backfilled with bentonite grout

BORING NUMBER B-5

CLIENT Shopoff Land Fund II, LP
PROJECT NAME HB-Seaside Magnolia
PROJECT NUMBER SHO-72233.4
PROJECT LOCATION Magnolia St. & Banning Ave., Huntington Beach, CA
DATE STARTED 1/15/16 **COMPLETED** 1/15/16
GROUND ELEVATION 4.7 feet **BORING DIAMETER** 6-inch
EQUIPMENT / RIG L-10-T Track Rig
HAMMER EFFICIENCY (%) 68
METHOD 140 lb Auto Hammer
SPT CORRECTION 1.13 **CAL CORRECTION** 0.62
LOGGED BY BM **CHECKED BY**
GROUNDWATER DEPTH (ft) 7
NOTES

DEPTH (ft)	MATERIAL DESCRIPTION	USCS SYMBOL	SAMPLE TYPE	PENETRATION RESISTANCE (blows/6-inches)	SPT N60	POCKET PEN (tsf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (PI:LL)	FINES CONTENT (%)	OTHER TESTS
0	**FILL**										
1	SILTY-CLAY, dark gray-brown, very moist, stiff	CL-ML									
2			BULK								
3	**YOUNG AXIAL CHANNEL DEPOSITS**		MC	4 4 5	6		41	81	14:46	97	SA
4	@ 2.5' SILT, brownish-gray and orange mottled, very moist to wet, soft; calcium carbonate stringers										
5		ML									
6	@ 5' shelby tube push		SH	1900psi							
7	▼ @ 7' Groundwater encountered at 7-feet										
8	@ 7.5' SILTY-SAND with CLAY, dark gray, very fine grained, wet, loose; abundant marine shell fragments	SC-SM	SPT	2 3 5	9						
9											
10	@ 10' SILTY-SAND, dark gray, very fine grained, wet, loose; common marine shell fragments		SPT	2 3 3	7					20	SA
11											
12											
13											
14											
15	@ 15' Becomes fine to medium grained, medium dense; trace marine shell fragments	SM	SPT	2 8 13	24						
16											
17											
18											
19											
20	@ 20' SAND, dark gray, fine to medium grained, wet, loose to medium dense; common marine shell fragments		SPT	4 6 7	15						
21											
22											
23											
24											
25		SP	SPT	14 7 3	11						
26											
27											
28											
29											
30	@ 30' SILTY-SAND, dark gray, very fine grained, wet, dense; scattered marine shell fragments	SM	SPT	P 10 17	31						
31											

GEOTECH LOG - COLUMNS BORING LOGS.GPJ GINT STD US LAB.GDT 2/17/16

(Continued Next Page)

BORING NUMBER B-5

CLIENT Shopoff Land Fund II, LP **PROJECT NAME** HB-Seaside Magnolia

PROJECT NUMBER SHO-72233.4 **PROJECT LOCATION** Magnolia St. & Banning Ave., Huntington Beach, CA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	USCS SYMBOL	SAMPLE TYPE	PENETRATION RESISTANCE (blows/6-inches)	SPT N60	POCKET PEN (tsf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (PI:LL)	FINES CONTENT (%)	OTHER TESTS
32		@ 30' SILTY-SAND, dark gray, very fine grained, wet, dense; scattered marine shell fragments *(continued)*										
33												
34												
35				SPT	14 15 20	40						
36												
37												
38												
39												
40				SPT	12 20 21	46						
41			SM									
42												
43												
44												
45				SPT	10 19 19	43						
46												
47												
48												
49												
50		@ 50' SILTY-CLAY, dark gray, wet, very stiff	CL-ML	SPT	5 6 10	18						
51												

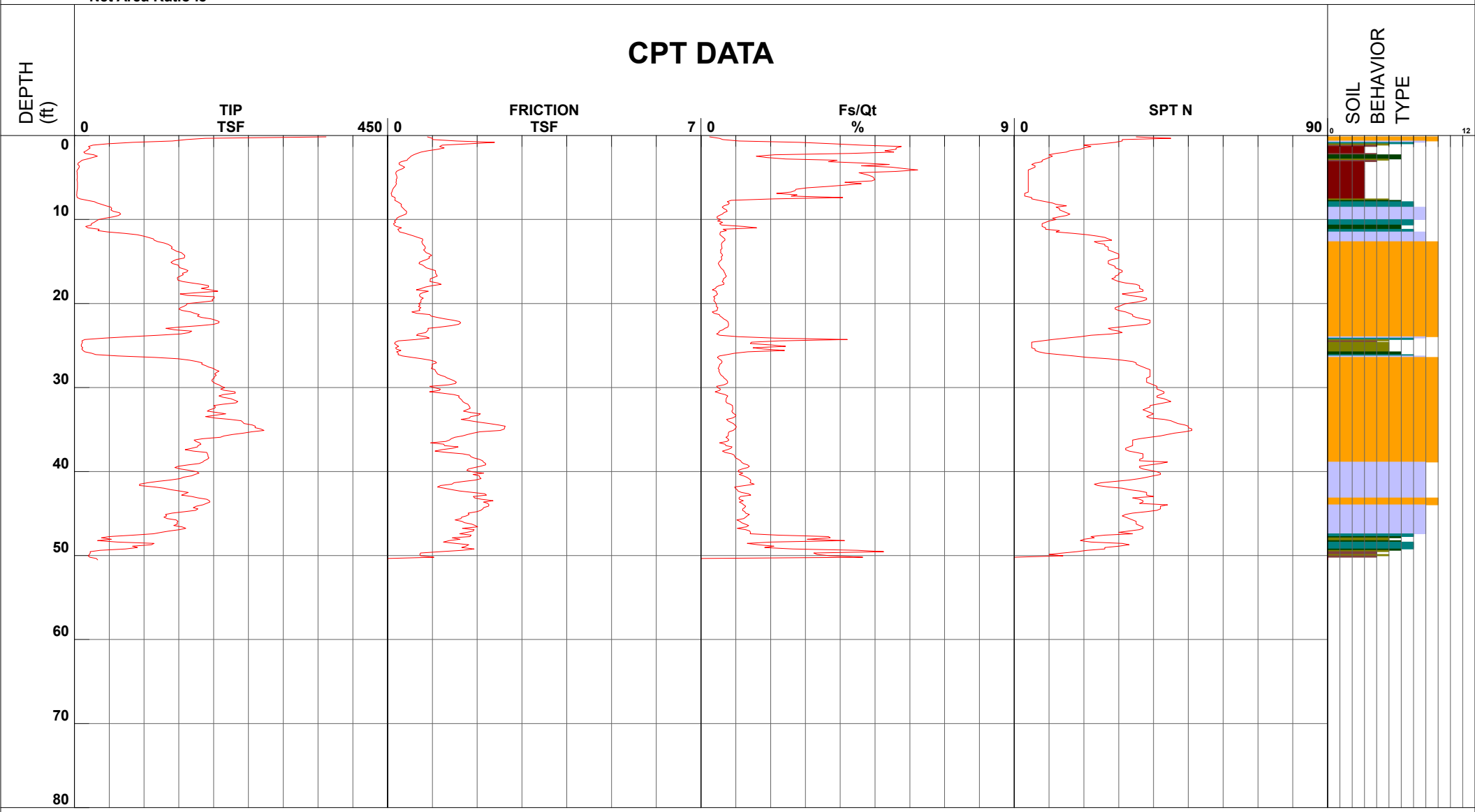
Total depth: 51.5-feet
Groundwater encountered @ 7-feet
Boring backfilled with bentonite grout

EEI

Project	Huntington Beach	Operator	DG-RC	Filename	SDF(020).cpt
Job Number	SHO-72233.4	Cone Number	DDG1350	GPS	
Hole Number	CPT-01	Date and Time	1/15/2016 8:41:23 AM	Maximum Depth	50.52 ft
EST GW Depth During Test		3.10 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

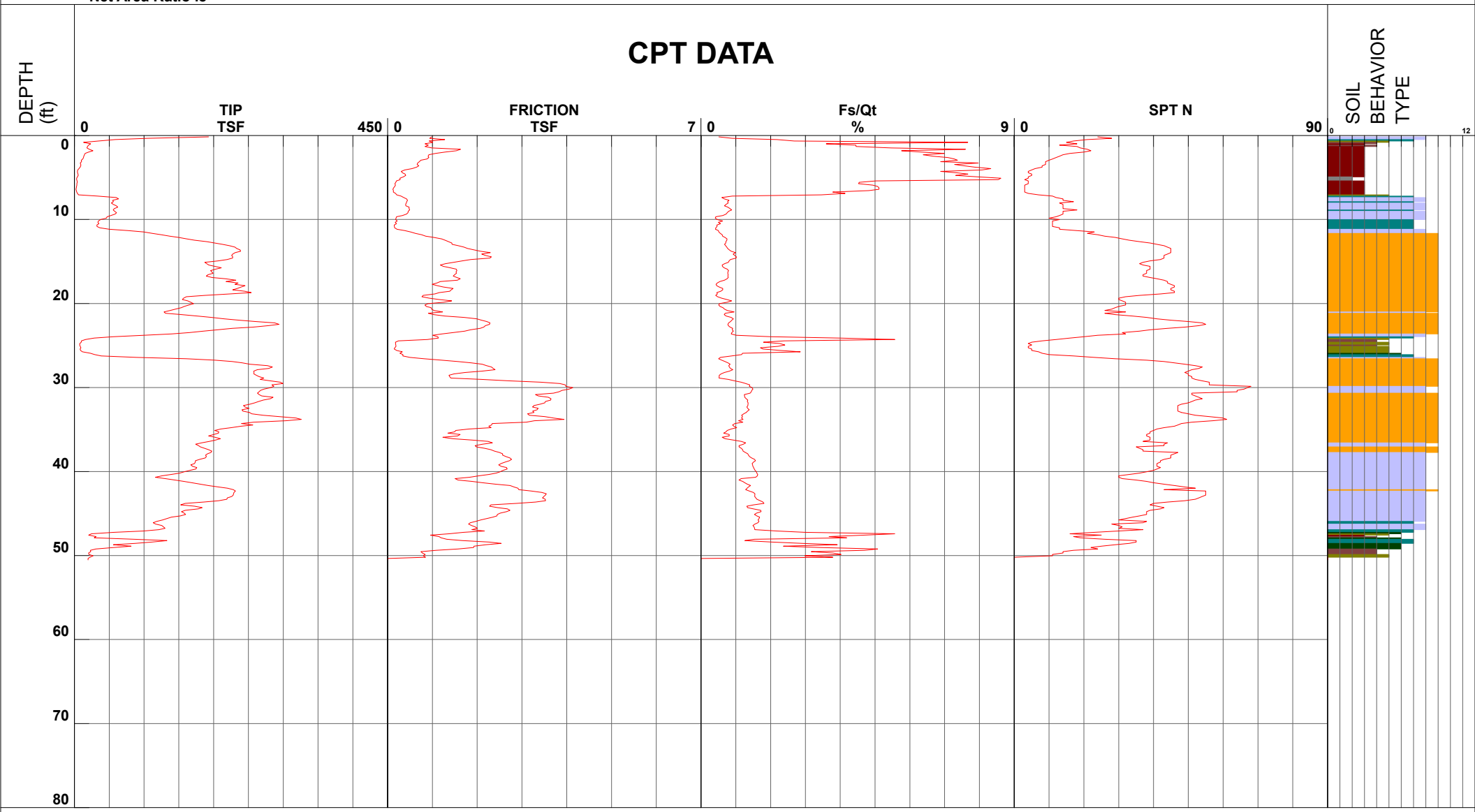
S*Soil behavior type and SPT based on data from UBC-1983

EEI

Project	Huntington Beach	Operator	DG-RC	Filename	SDF(019).cpt
Job Number	SHO-72233.4	Cone Number	DDG1350	GPS	
Hole Number	CPT-02	Date and Time	1/15/2016 7:55:34 AM	Maximum Depth	50.52 ft
EST GW Depth During Test		5.47 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

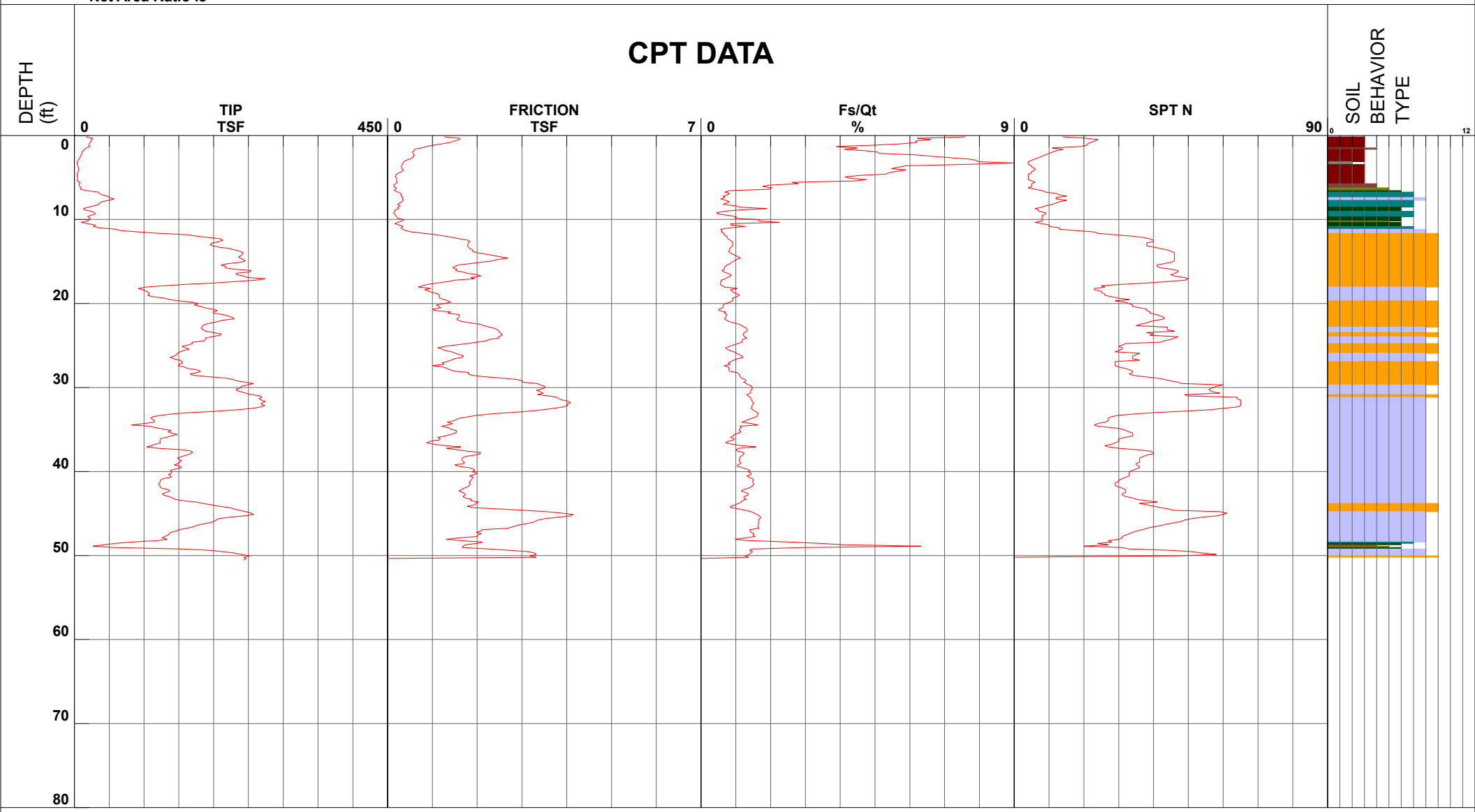
S*Soil behavior type and SPT based on data from UBC-1983

EEI

Project	Huntington Beach	Operator	DG-RC	Filename	SDF(027).cpt
Job Number	SHO-72233.4	Cone Number	DDG1350	GPS	
Hole Number	CPT-03	Date and Time	1/15/2016 2:59:41 PM	Maximum Depth	50.52 ft
EST GW Depth During Test		0.40 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

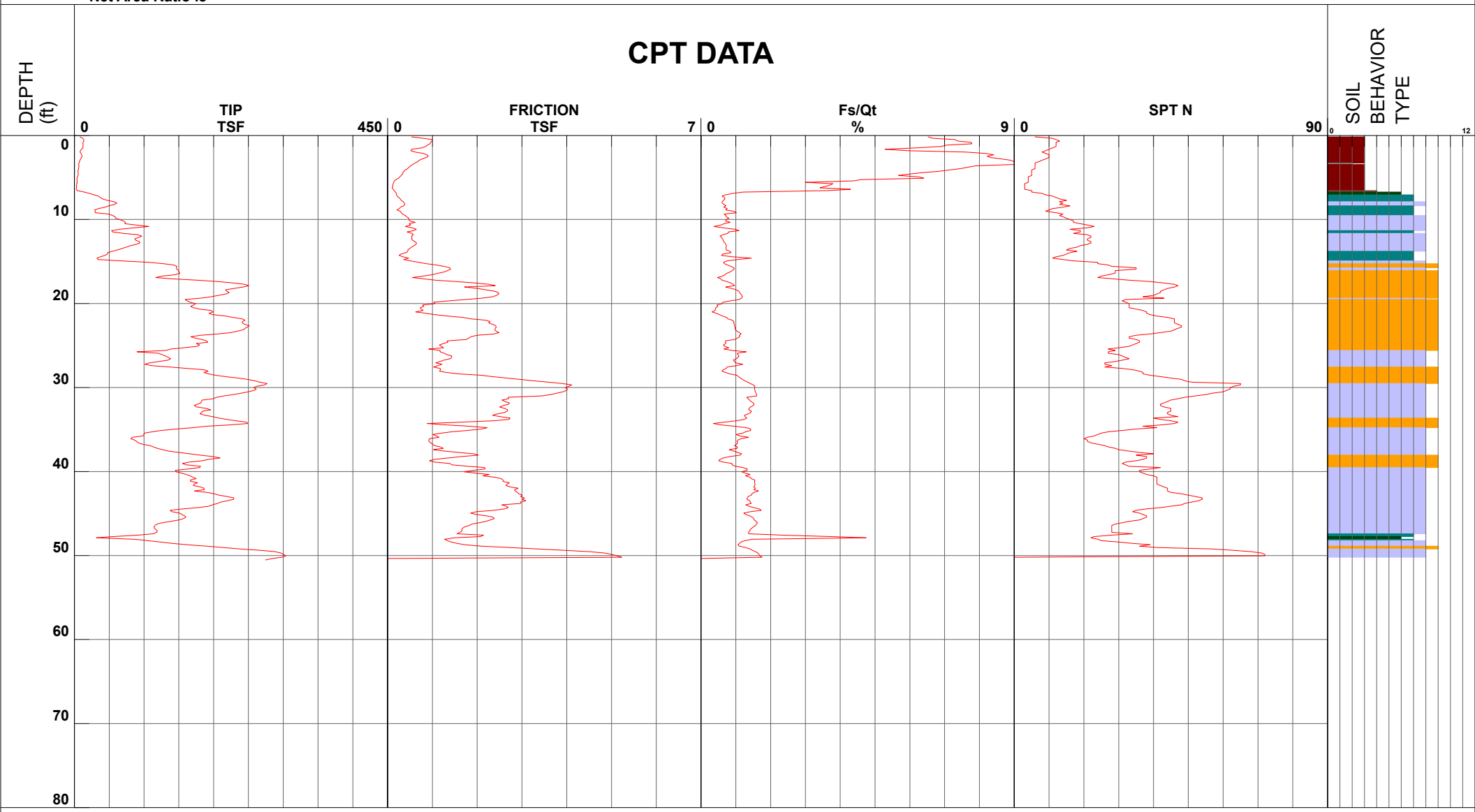
S*Soil behavior type and SPT based on data from UBC-1983

EEI

Project	Huntington Beach	Operator	DG-RC	Filename	SDF(028).cpt
Job Number	SHO-72233.4	Cone Number	DDG1350	GPS	
Hole Number	CPT-04	Date and Time	1/15/2016 3:46:17 PM	Maximum Depth	50.52 ft
EST GW Depth During Test		1.35 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

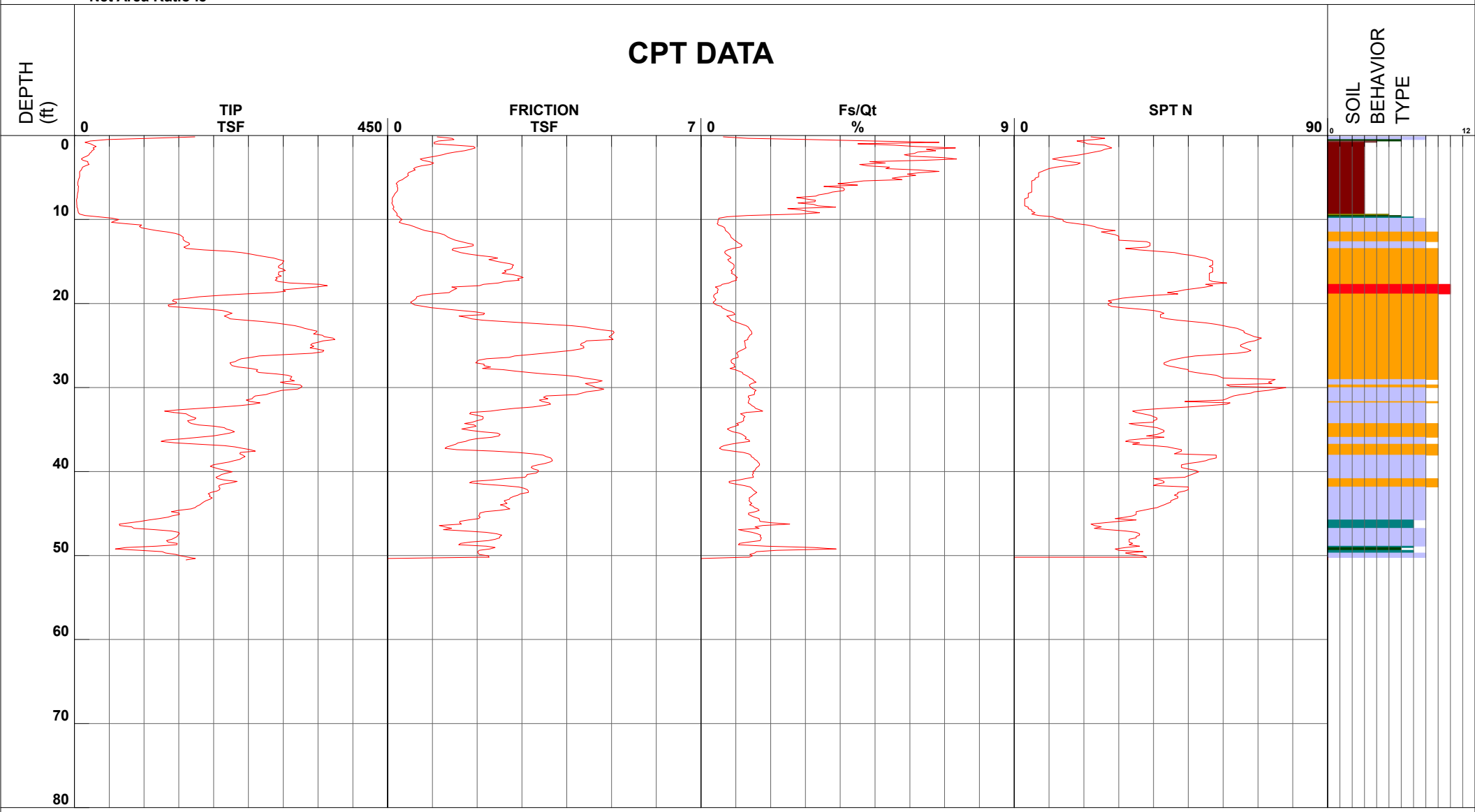
S*Soil behavior type and SPT based on data from UBC-1983

EEI

Project	Huntington Beach	Operator	DG-RC	Filename	SDF(021).cpt
Job Number	SHO-72233.4	Cone Number	DDG1350	GPS	
Hole Number	CPT-05	Date and Time	1/15/2016 9:38:05 AM	Maximum Depth	50.52 ft
EST GW Depth During Test		3.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

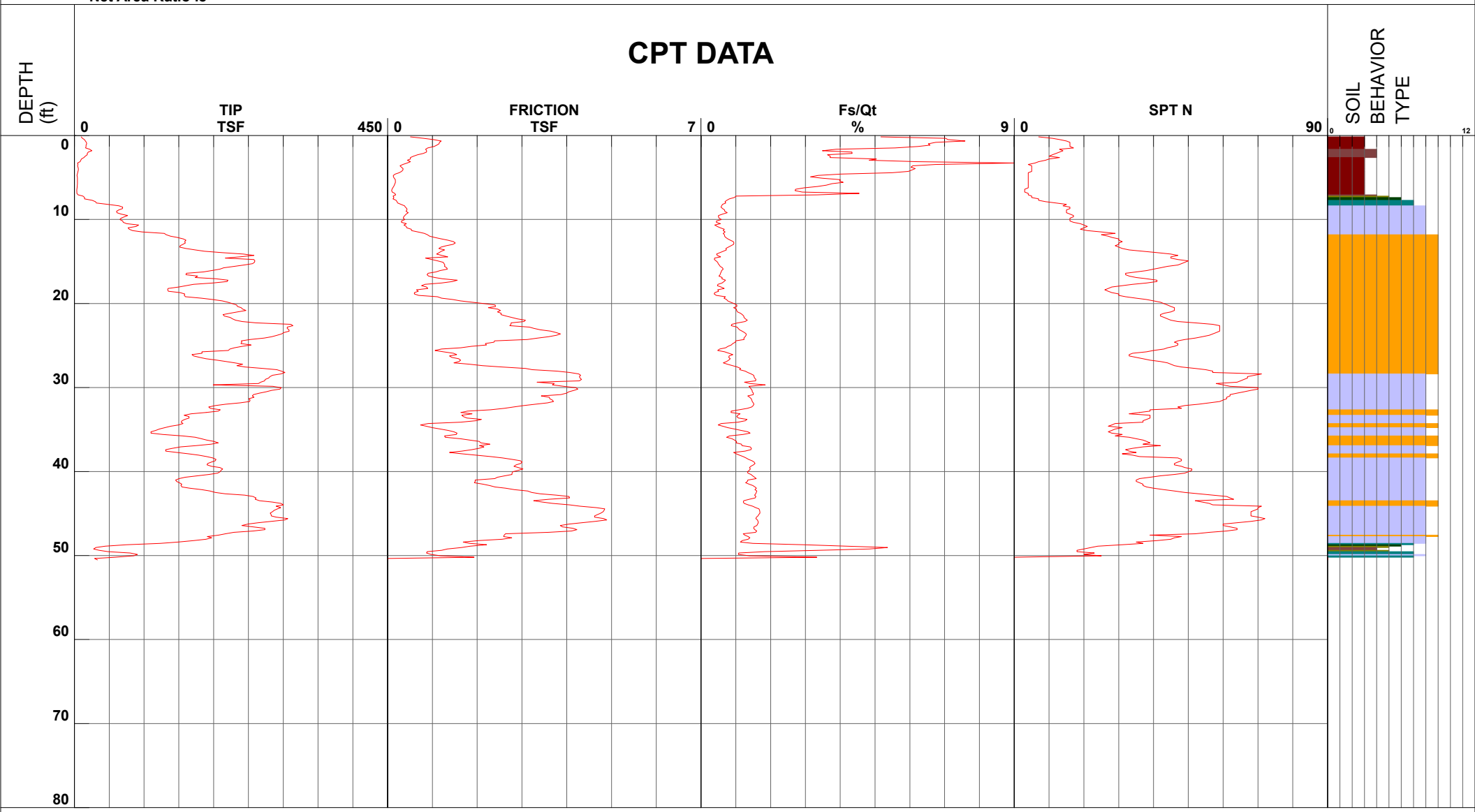
S*Soil behavior type and SPT based on data from UBC-1983

EEI

Project	Huntington Beach	Operator	DG-RC	Filename	SDF(026).cpt
Job Number	SHO-72233.4	Cone Number	DDG1350	GPS	
Hole Number	CPT-06	Date and Time	1/15/2016 2:13:37 PM	Maximum Depth	50.52 ft
EST GW Depth During Test		1.70 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

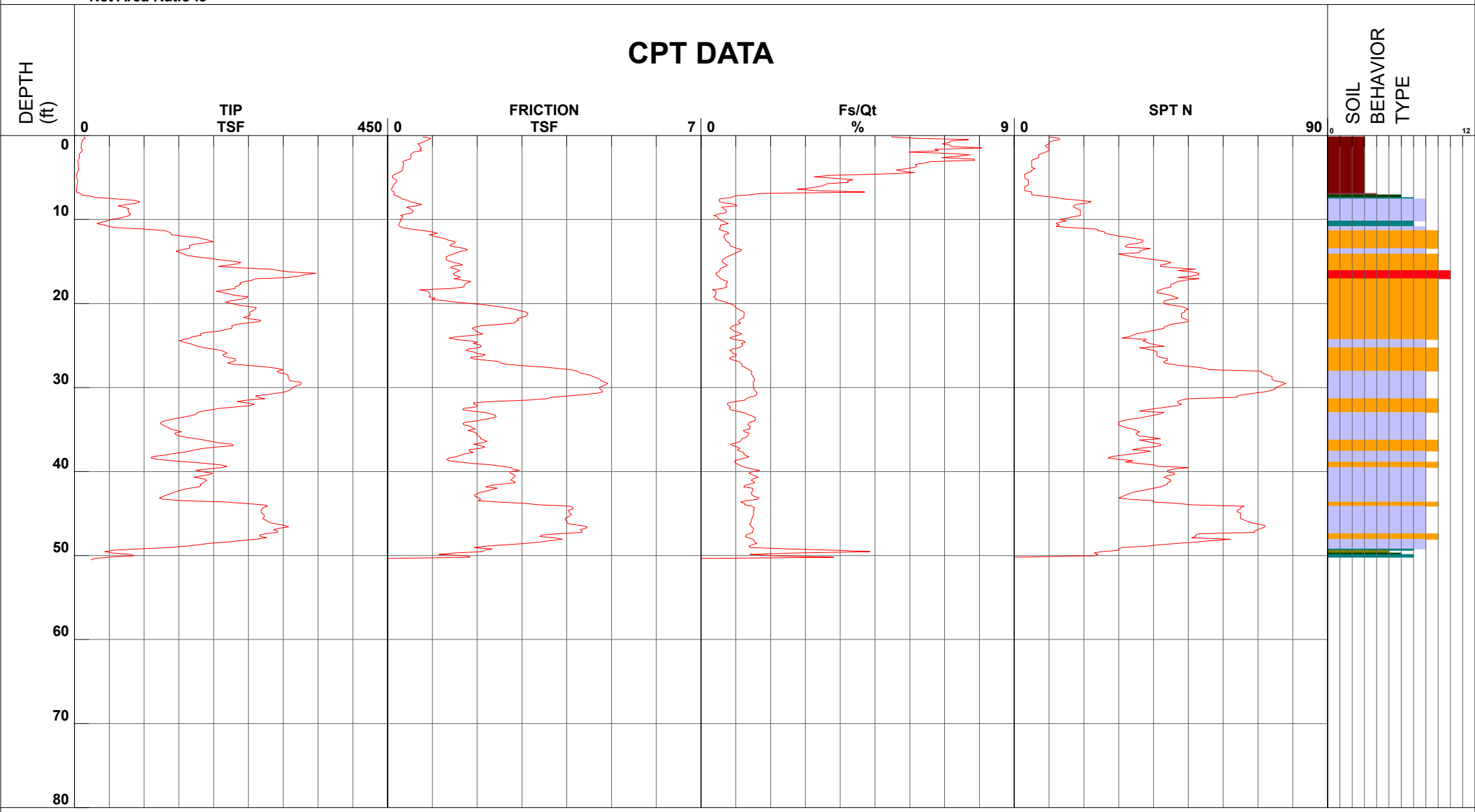
S*Soil behavior type and SPT based on data from UBC-1983

EEI

Project	Huntington Beach	Operator	DG-RC	Filename	SDF(025).cpt
Job Number	SHO-72233.4	Cone Number	DDG1350	GPS	
Hole Number	CPT-07	Date and Time	1/15/2016 1:18:06 PM	Maximum Depth	50.52 ft
EST GW Depth During Test		2.14 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

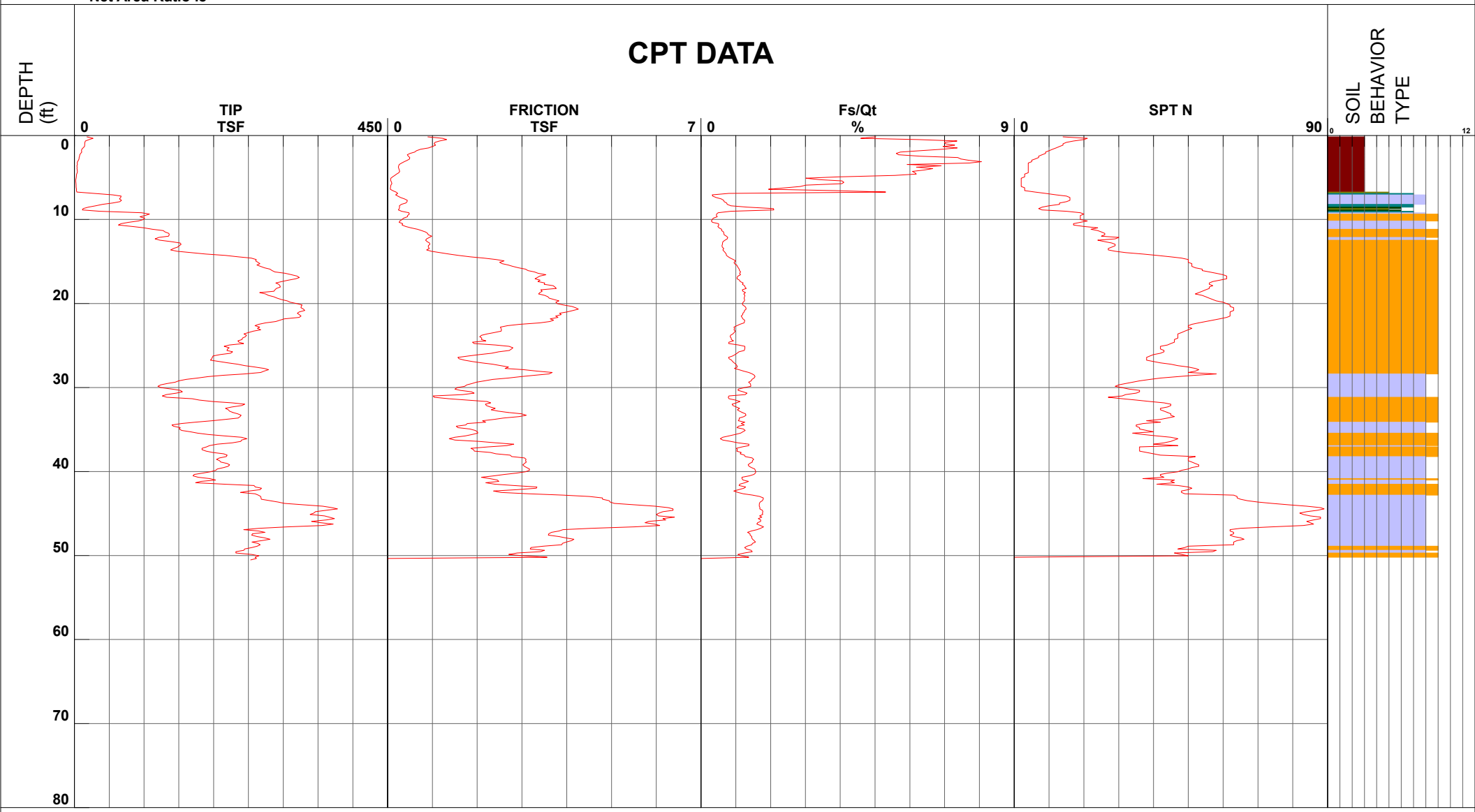
S*Soil behavior type and SPT based on data from UBC-1983

EEI

Project	Huntington Beach	Operator	DG-RC	Filename	SDF(013).cpt
Job Number	SHO-72233.4	Cone Number	DDG1350	GPS	
Hole Number	CPT-08	Date and Time	1/14/2016 11:03:43 AM	Maximum Depth	50.52 ft
EST GW Depth During Test		5.10 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

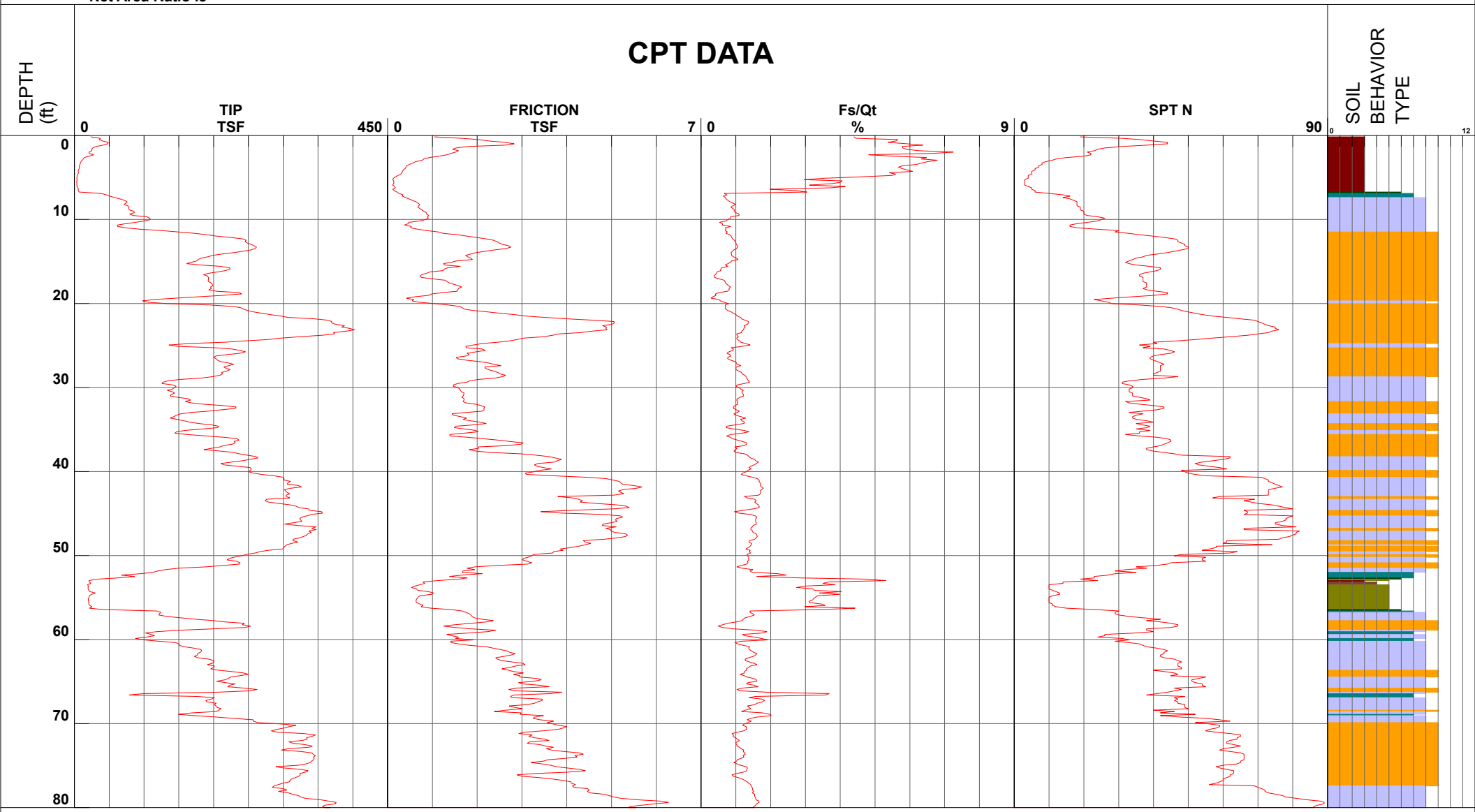
S*Soil behavior type and SPT based on data from UBC-1983

EEI

Project	Huntington Beach	Operator	DG-RC	Filename	SDF(015).cpt
Job Number	SHO-72233.4	Cone Number	DDG1350	GPS	
Hole Number	CPT-09	Date and Time	1/14/2016 12:35:23 PM	Maximum Depth	80.54 ft
EST GW Depth During Test		2.80 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

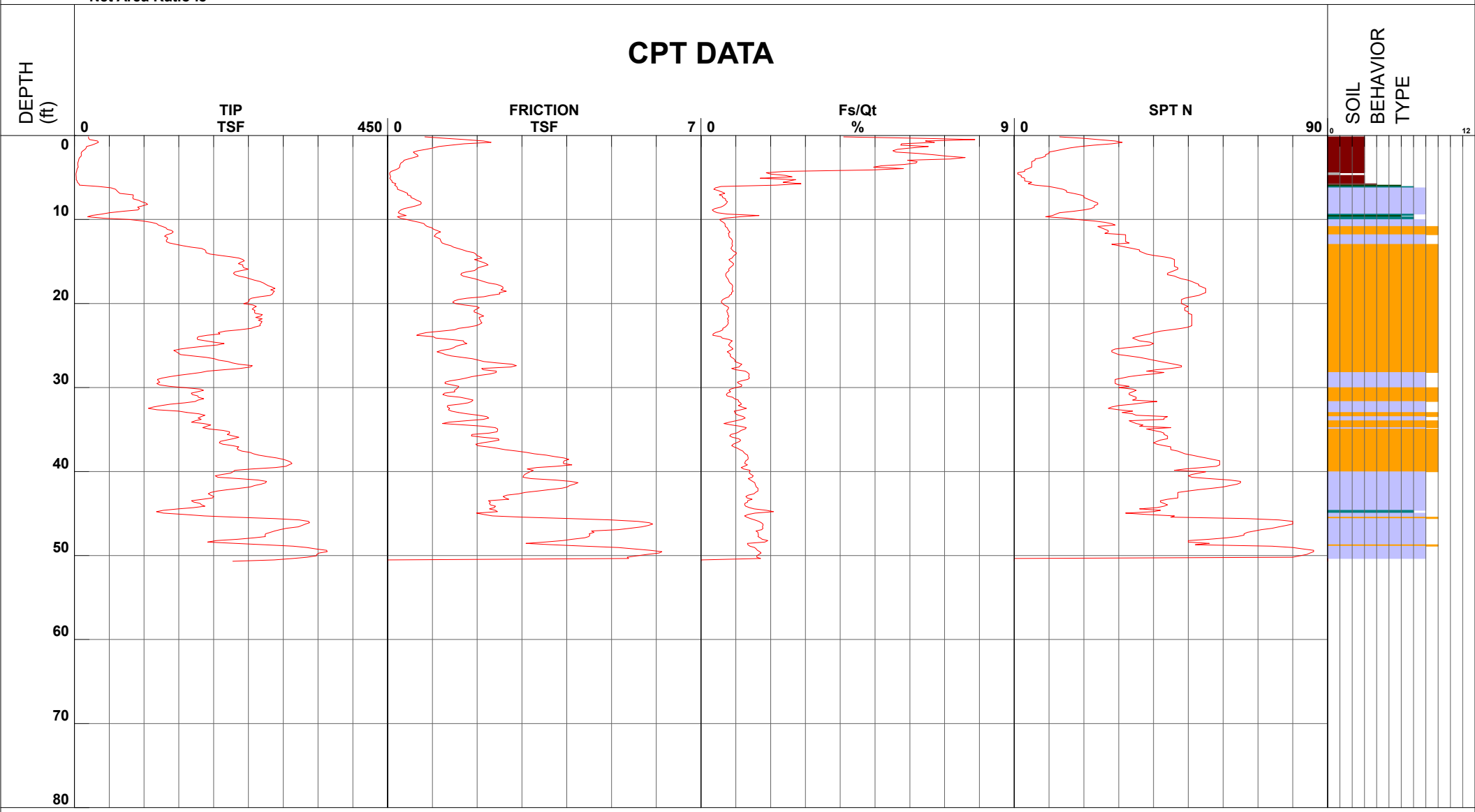
S*Soil behavior type and SPT based on data from UBC-1983

EEI

Project	Huntington Beach	Operator	DG-RC	Filename	SDF(023).cpt
Job Number	SHO-72233.4	Cone Number	DDG1350	GPS	
Hole Number	CPT-10	Date and Time	1/15/2016 11:33:37 AM	Maximum Depth	50.69 ft
EST GW Depth During Test		2.58 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

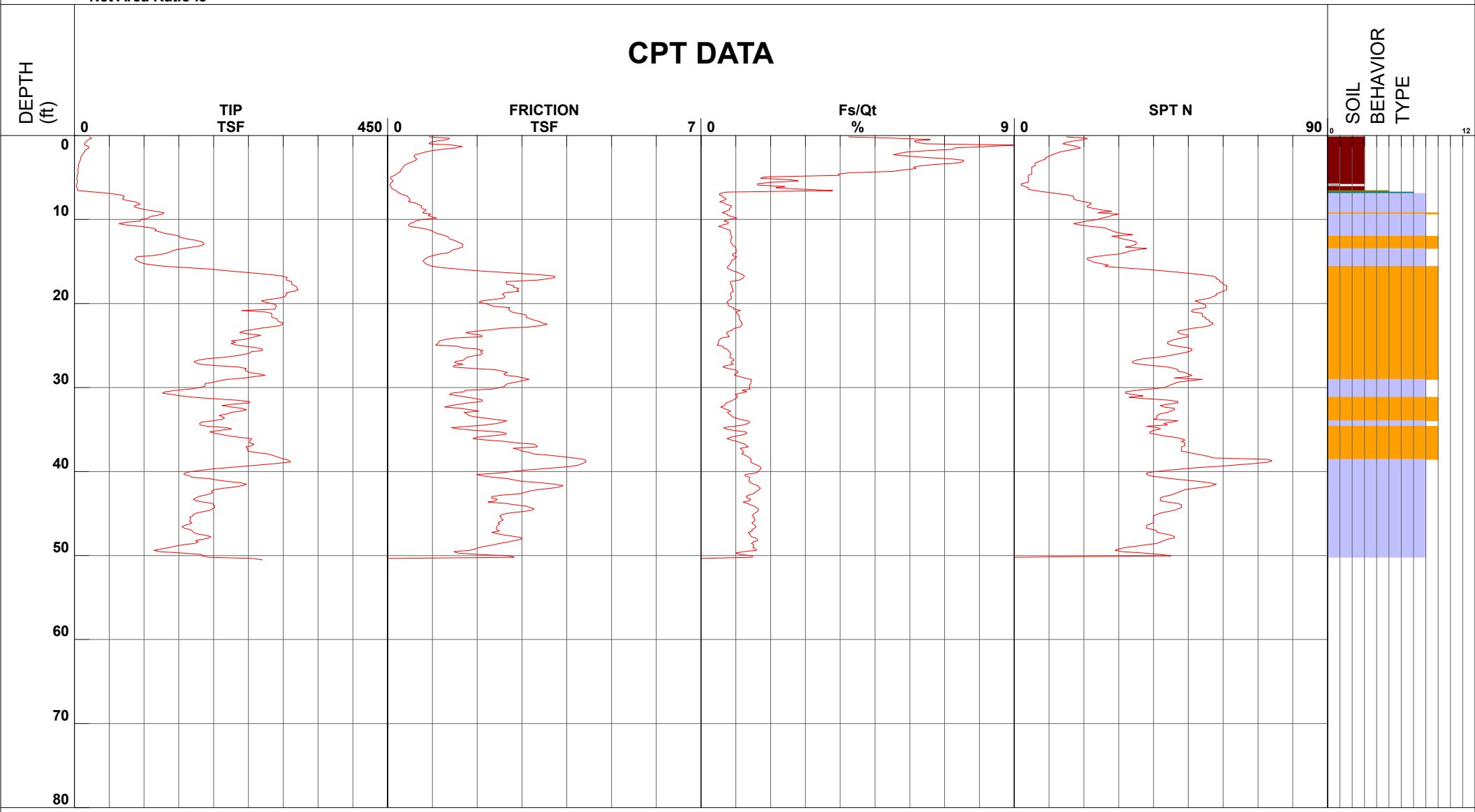
S*Soil behavior type and SPT based on data from UBC-1983

EEI

Project	Huntington Beach	Operator	DG-RC	Filename	SDF(022).cpt
Job Number	SHO-72233.4	Cone Number	DDG1350	GPS	
Hole Number	CPT-11	Date and Time	1/15/2016 10:19:30 AM	Maximum Depth	50.52 ft
EST GW Depth During Test		3.40 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

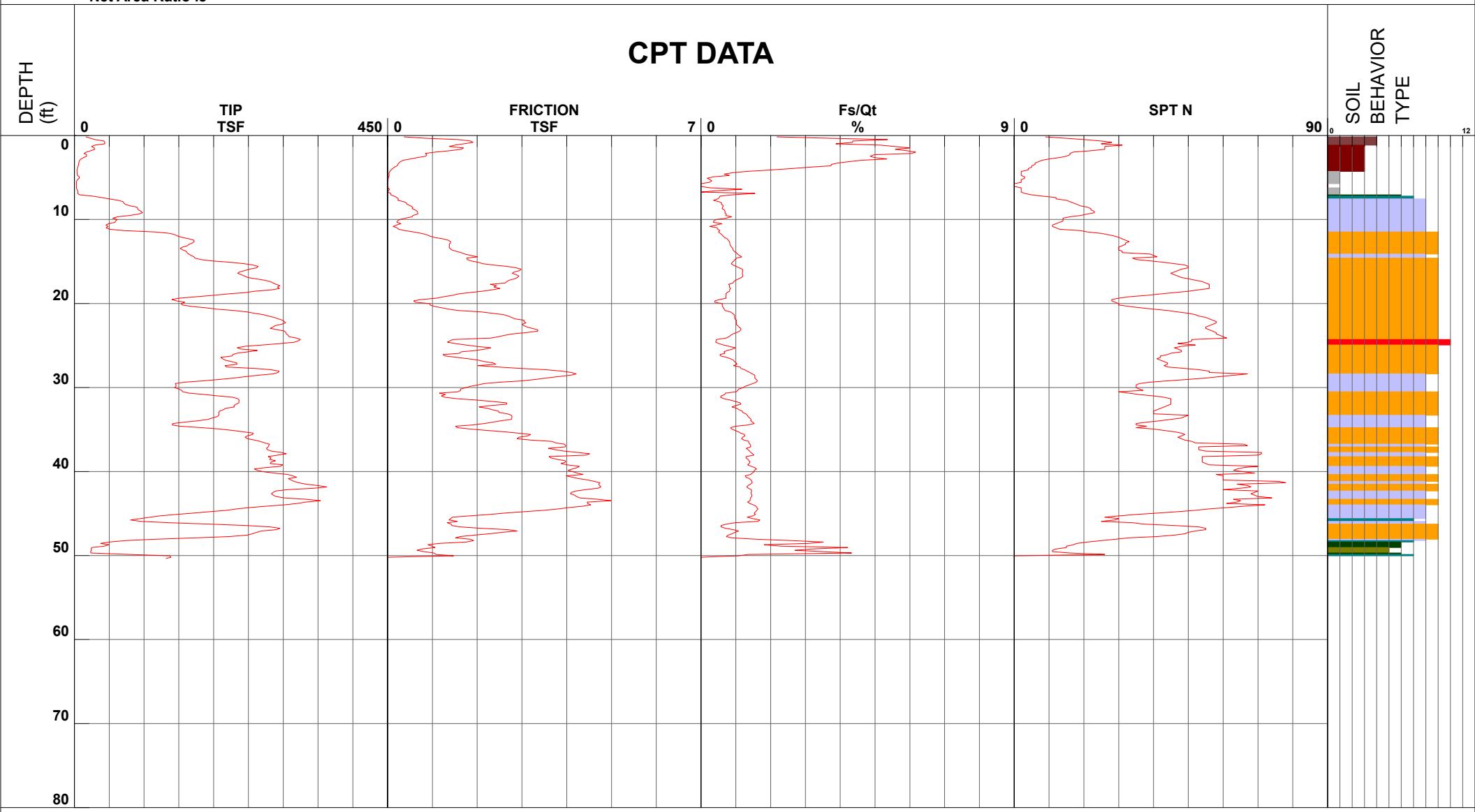
S*Soil behavior type and SPT based on data from UBC-1983

EEI

Project	Huntington Beach	Operator	DG-RC	Filename	SDF(018).cpt
Job Number	SHO-72233.4	Cone Number	DDG1350	GPS	
Hole Number	CPT-12	Date and Time	1/14/2016 3:50:48 PM	Maximum Depth	50.36 ft
EST GW Depth During Test		0.66 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

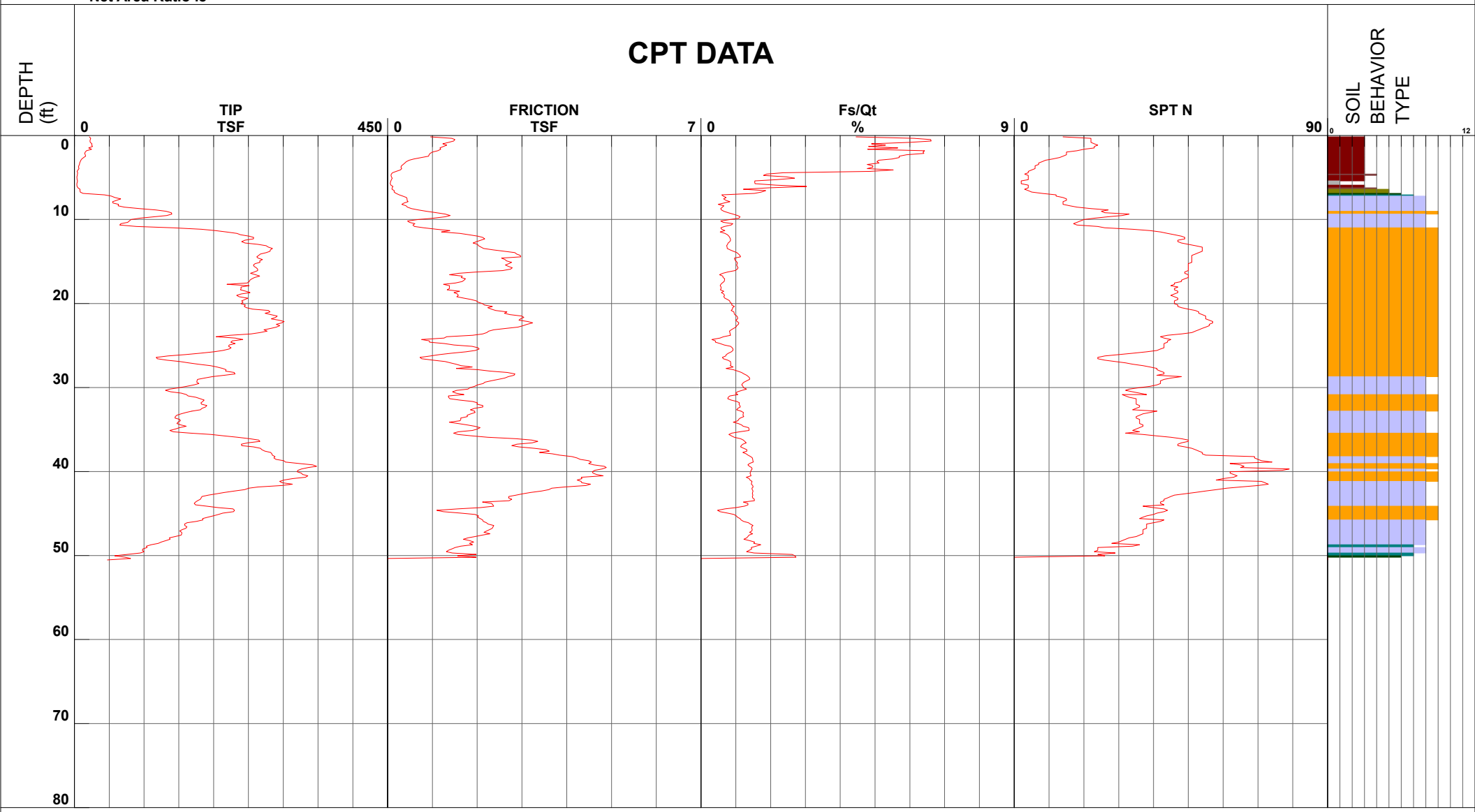
S*Soil behavior type and SPT based on data from UBC-1983

EEI

Project	Huntington Beach	Operator	DG-RC	Filename	SDF(024).cpt
Job Number	SHO-72233.4	Cone Number	DDG1350	GPS	
Hole Number	CPT-13	Date and Time	1/15/2016 12:19:55 PM	Maximum Depth	50.52 ft
EST GW Depth During Test		0.62 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

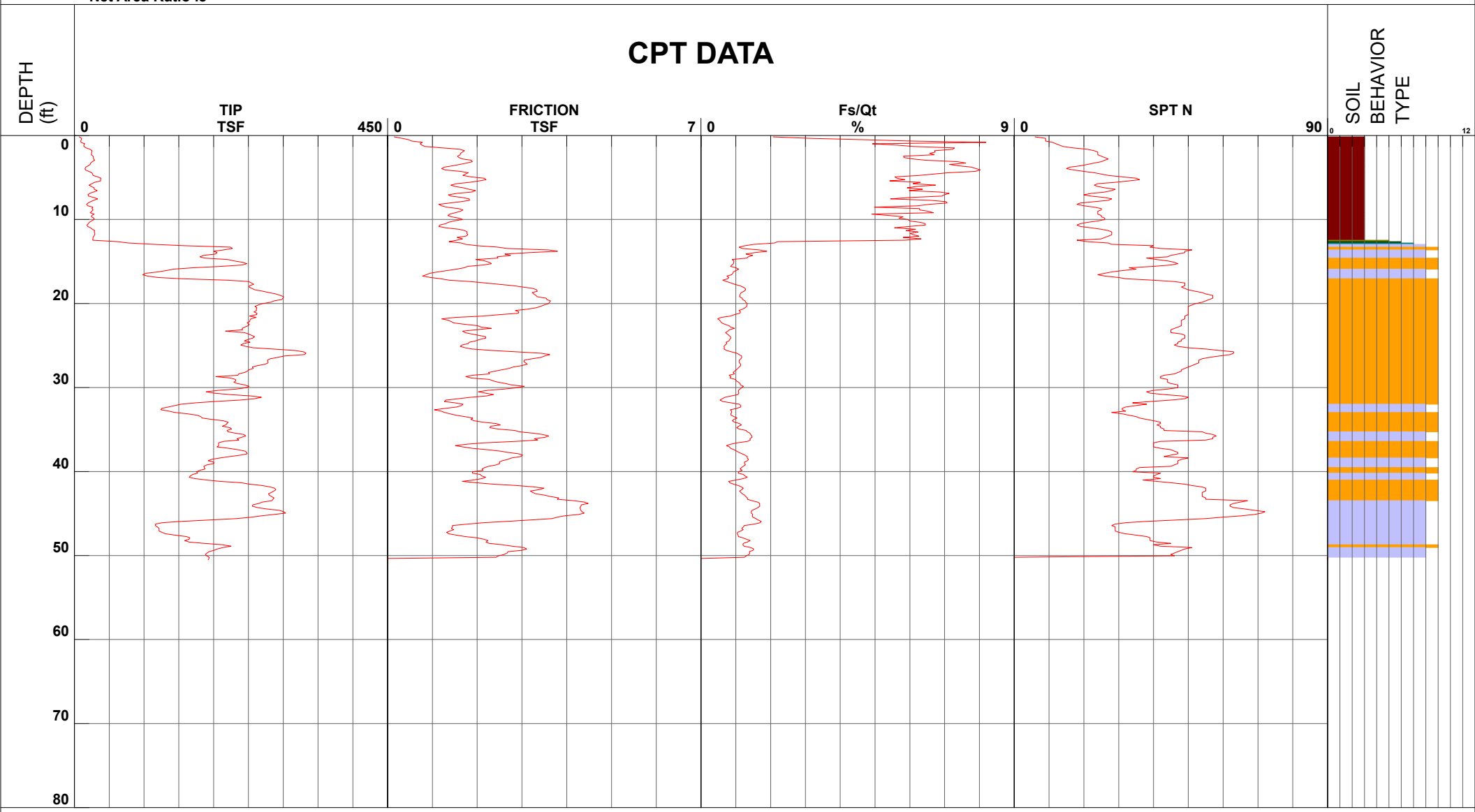
S*Soil behavior type and SPT based on data from UBC-1983

EEI

Project	Huntington Beach	Operator	DG-RC	Filename	SDF(017).cpt
Job Number	SHO-72233.4	Cone Number	DDG1350	GPS	
Hole Number	CPT-14	Date and Time	1/14/2016 2:49:09 PM	Maximum Depth	50.52 ft
EST GW Depth During Test		9.40 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

APPENDIX B
LABORATORY TESTING

Laboratory tests were performed to provide geotechnical parameters for engineering analyses. The following tests were performed:

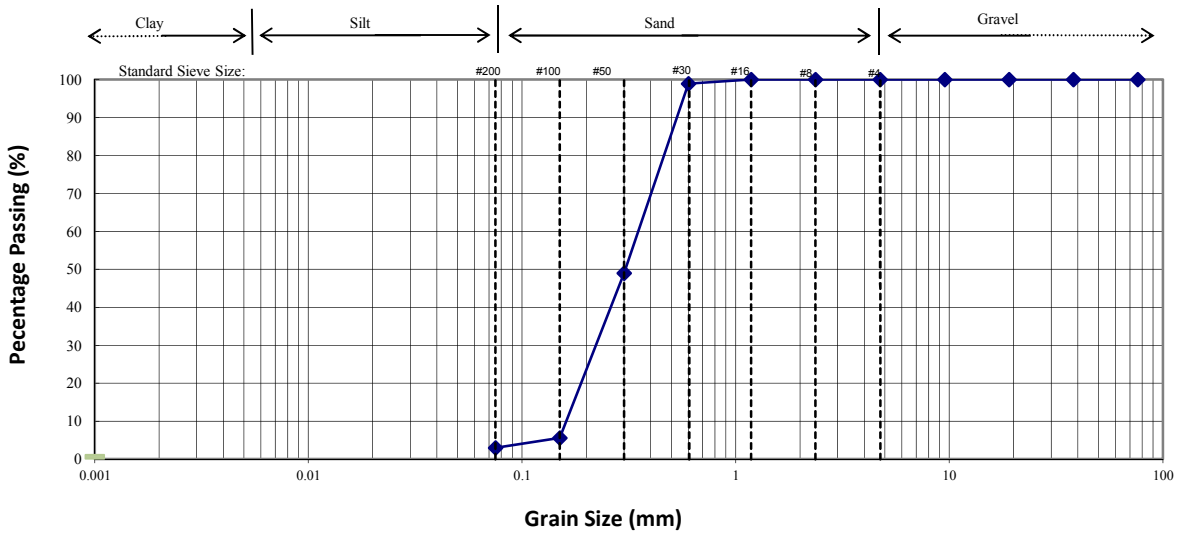
- **CLASSIFICATION:** Field classifications were verified in the laboratory by visual examination. The final soil classifications are in accordance with the Unified Soil Classification System.
- **GRAIN SIZE DISTRIBUTION:** The grain size distribution was determined on six samples in accordance with ASTM D422.
- **PERCENT PASSING #200 SIEVE:** The percent passing the #200 sieve was determined on four samples in accordance with ASTM D422. The test results are presented on the boring logs in Appendix A.
- **DIRECT SHEAR:** The effective stress shear strength was determined on two samples in accordance with ASTM D3080.
- **CONSOLIDATION:** A one-dimension consolidation test was performed on two samples in accordance with ASTM D2435.
- **ATTERBERG LIMITS:** The Atterberg limits were determined on four samples in accordance with ASTM D4318.
- **CORROSIVITY**: Two representative sample of onsite earth material was collected for analysis at Clarkson Laboratory and Supply, Inc. located in Chula Vista, California for corrosion/soluble sulfate potential. This corrosion testing included soil minimum resistivity and pH by California Test 643, sulfate by California Test 417, and chloride by California Test 422
- **IN SITU MOISTURE AND DENSITY:** The in situ moisture content and dry unit weight were determined on samples collected from the boring. The test results are presented on the boring logs in Appendix A.

PARTICLE-SIZE ANALYSIS OF SOILS

ASTM METHOD D422 (SIEVE ANALYSIS)

Boring/Depth	B-1	15 ft.	D_{10} (mm)	0.165
Total Weight (gm)	120.8		D_{30} (mm)	0.23
Dry Weight (gm)	100.8		D_{60} (mm)	0.37
Wet Sieve Weight (gm)	97.8		Cu	2.21
Initial Moisture (%)	19.8		Cc	0.91

Soil classified in accordance with ASTM D2487 (Unified Soil Classification System) and ASTM D422 (Sieve Analysis)



Sieve Size (in)	Sieve Size (mm)	Cumulative W_{dry} (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75		0.0	100.0
#8	2.36		0.0	100.0
#16	1.18		0.0	100.0
#30	0.6	1.1	1.1	98.9
#50	0.3	51.4	51.0	49.0
#100	0.15	95.2	94.4	5.6
#200	0.075	97.8	97.0	3.0

EEI Geotechnical & Environmental Solutions

2195 Faraday Avenue, Suite K, Carlsbad CA 92008

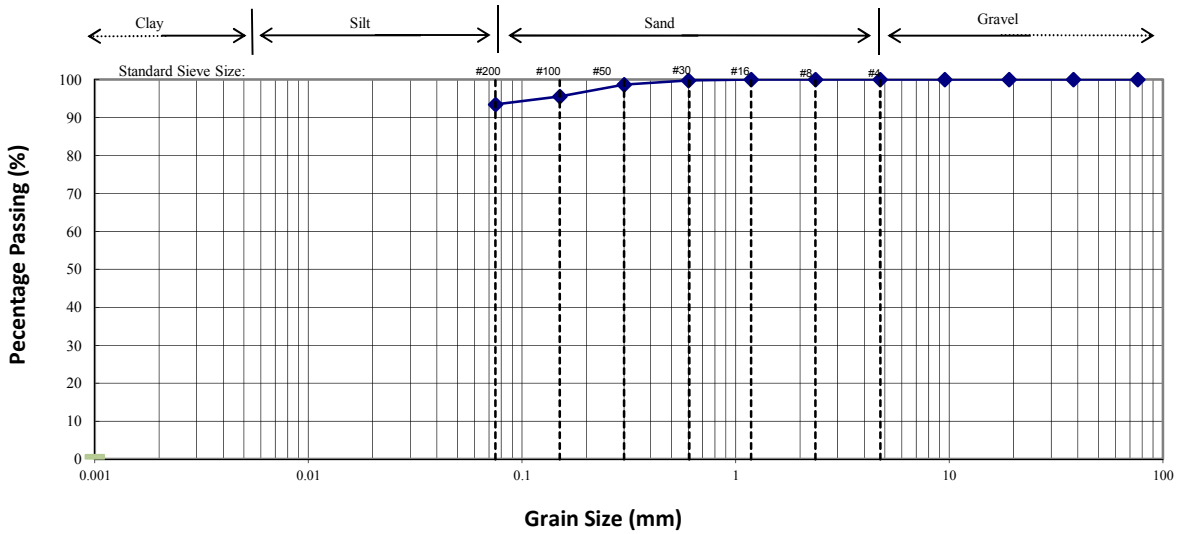
Client:	Shopoff LLC.
Project Name:	HB Seaside Magnolia
Job Number:	SHO-72233.4A
Date:	1/22/16
Boring Number:	B-1
Depth:	15 ft.
Soil Classififcation:	Poorly Graded Sand (SP)
Tested By:	B D

PARTICLE-SIZE ANALYSIS OF SOILS

ASTM METHOD D422 (SIEVE ANALYSIS)

Boring/Depth	B-3	0-5 ft.	D_{10} (mm)	N/A
Total Weight (gm)	114.7		D_{30} (mm)	N/A
Dry Weight (gm)	83.0		D_{60} (mm)	N/A
Wet Sieve Weight (gm)	5.4		Cu	N/A
Initial Moisture (%)	38.2		Cc	N/A

Soil classified in accordance with ASTM D2487 (Unified Soil Classification System) and ASTM D422 (Sieve Analysis)



Sieve Size (in)	Sieve Size (mm)	Cumulative W_{dry} (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53	0.0	0.0	100.0
#4	4.75	0.0	0.0	100.0
#8	2.36	0.0	0.0	100.0
#16	1.18	0.0	0.0	100.0
#30	0.6	0.2	0.2	99.8
#50	0.3	1.1	1.3	98.7
#100	0.15	3.7	4.5	95.5
#200	0.075	5.4	6.5	93.5

EEI Geotechnical & Environmental Solutions

2195 Faraday Avenue, Suite K, Carlsbad CA 92008

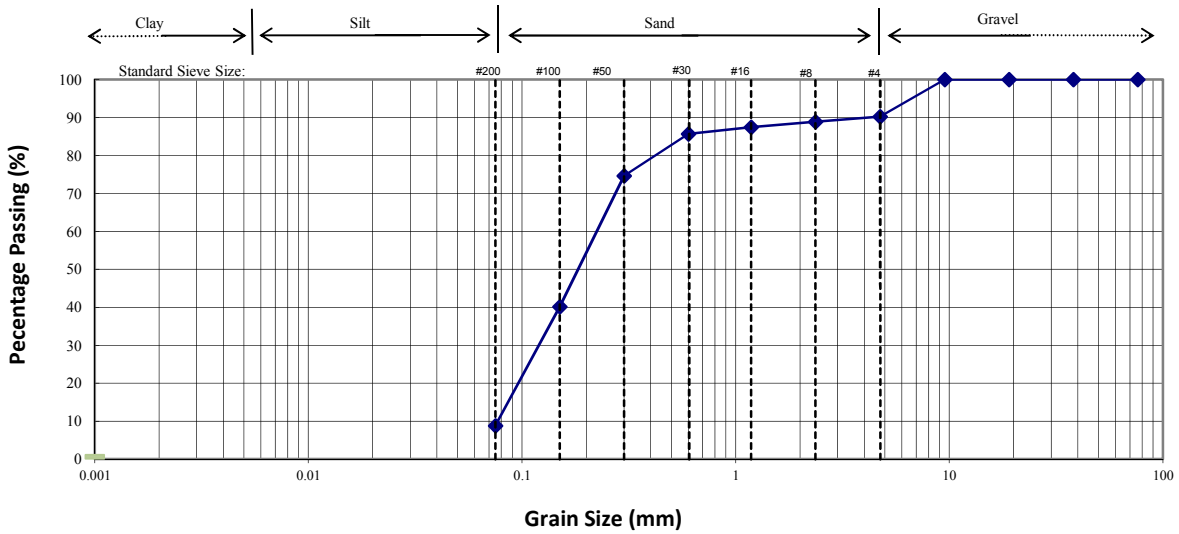
Client:	Shopoff LLC.
Project Name:	HB Seaside Magnolia
Job Number:	SHO-72233.4A
Date:	1/22/16
Boring Number:	B-3
Depth:	0-5 ft.
Soil Classififcation:	Elastic Silt (MH)
Tested By:	B D

PARTICLE-SIZE ANALYSIS OF SOILS

ASTM METHOD D422 (SIEVE ANALYSIS)

Boring/Depth	B-3	15 ft.	D_{10} (mm)	0.078
Total Weight (gm)	116.9		D_{30} (mm)	0.13
Dry Weight (gm)	96.3		D_{60} (mm)	0.24
Wet Sieve Weight (gm)	87.8		Cu	3.04
Initial Moisture (%)	21.4		Cc	0.86

Soil classified in accordance with ASTM D2487 (Unified Soil Classification System) and ASTM D422 (Sieve Analysis)



Sieve Size (in)	Sieve Size (mm)	Cumulative W_{dry} (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	9.4	9.8	90.2
#8	2.36	10.7	11.1	88.9
#16	1.18	12.1	12.6	87.4
#30	0.6	13.8	14.3	85.7
#50	0.3	24.4	25.3	74.7
#100	0.15	57.6	59.8	40.2
#200	0.075	87.8	91.2	8.8

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2195 Faraday Avenue, Suite K, Carlsbad CA 92008

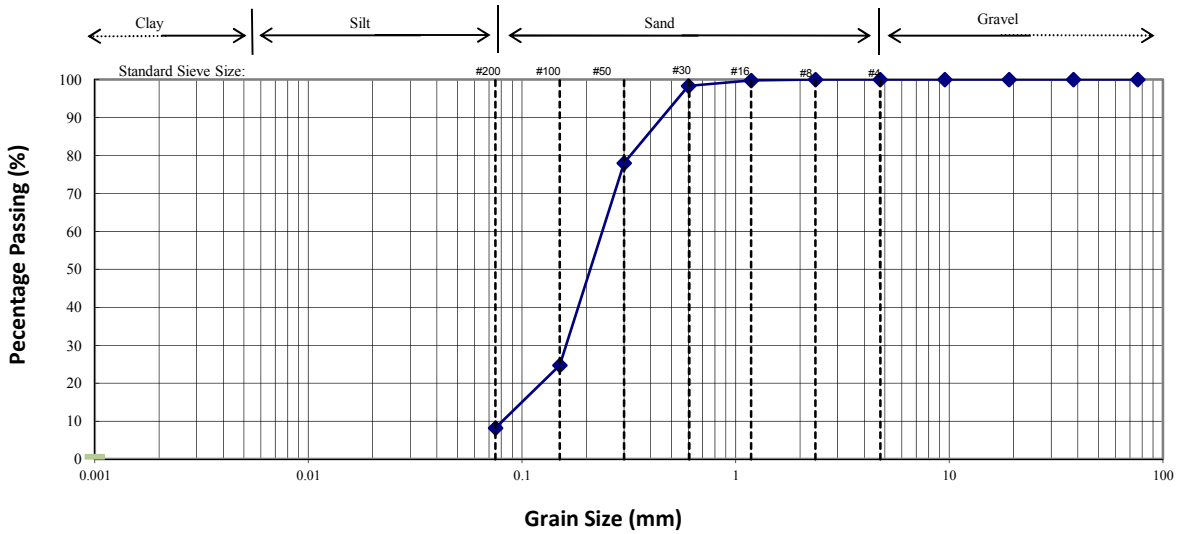
Client:	Shopoff LLC.
Project Name:	HB Seaside Magnolia
Job Number:	SHO-72233.4A
Date:	1/22/16
Boring Number:	B-3
Depth:	15 ft.
Soil Classififcation:	Poorly Graded Sand with Silt
Tested By:	B D

PARTICLE-SIZE ANALYSIS OF SOILS

ASTM METHOD D422 (SIEVE ANALYSIS)

Boring/Depth	B-4	10 ft.	D_{10} (mm)	0.083
Total Weight (gm)	118.5		D_{30} (mm)	0.16
Dry Weight (gm)	95.0		D_{60} (mm)	0.25
Wet Sieve Weight (gm)	87.2		Cu	3.00
Initial Moisture (%)	24.7		Cc	1.31

Soil classified in accordance with ASTM D2487 (Unified Soil Classification System) and ASTM D422 (Sieve Analysis)



Sieve Size (in)	Sieve Size (mm)	Cumulative W_{dry} (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	0.0	0.0	100.0
#8	2.36	0.0	0.0	100.0
#16	1.18	0.2	0.2	99.8
#30	0.6	1.6	1.7	98.3
#50	0.3	20.9	22.0	78.0
#100	0.15	71.5	75.3	24.7
#200	0.075	87.2	91.8	8.2

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2195 Faraday Avenue, Suite K, Carlsbad CA 92008

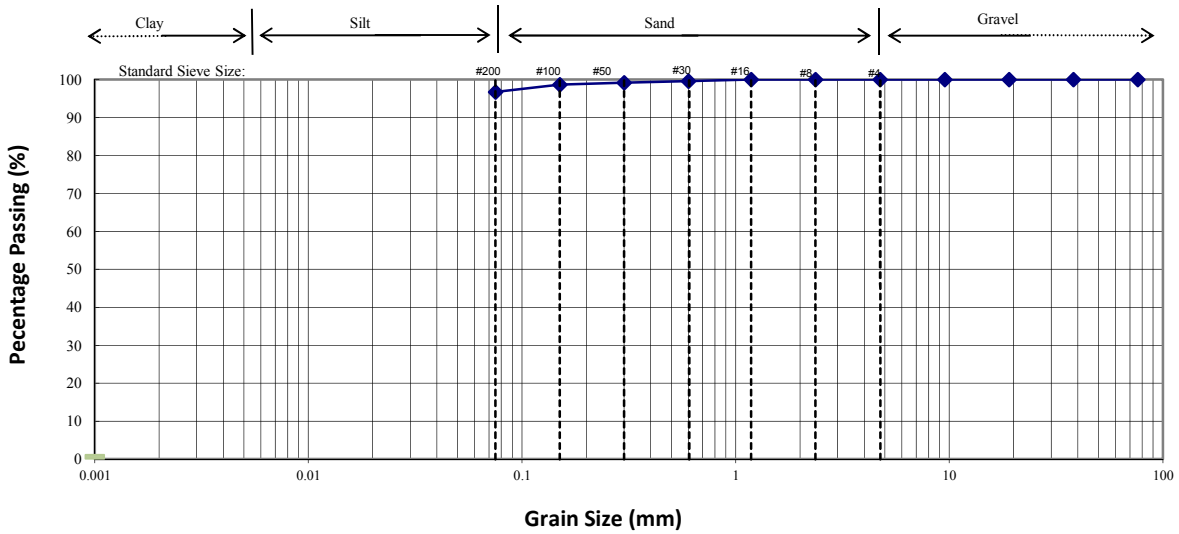
Client:	Shopoff LLC.
Project Name:	HB Seaside Magnolia
Job Number:	SHO-72233.4A
Date:	1/22/16
Boring Number:	B-4
Depth:	10 ft.
Soil Classififcation:	Poorly Graded Sand with Silt
Tested By:	B D

PARTICLE-SIZE ANALYSIS OF SOILS

ASTM METHOD D422 (SIEVE ANALYSIS)

Boring/Depth	B-5	2.5 ft.	D_{10} (mm)	N/A
Total Weight (gm)	103.9		D_{30} (mm)	N/A
Dry Weight (gm)	74.8		D_{60} (mm)	N/A
Wet Sieve Weight (gm)	2.4		Cu	N/A
Initial Moisture (%)	38.9		Cc	N/A

Soil classified in accordance with ASTM D2487 (Unified Soil Classification System) and ASTM D422 (Sieve Analysis)



Sieve Size (in)	Sieve Size (mm)	Cumulative W_{dry} (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53	0.0	0.0	100.0
#4	4.75	0.0	0.0	100.0
#8	2.36	0.0	0.0	100.0
#16	1.18	0.0	0.0	100.0
#30	0.6	0.3	0.4	99.6
#50	0.3	0.6	0.8	99.2
#100	0.15	1.0	1.3	98.7
#200	0.075	2.4	3.2	96.8

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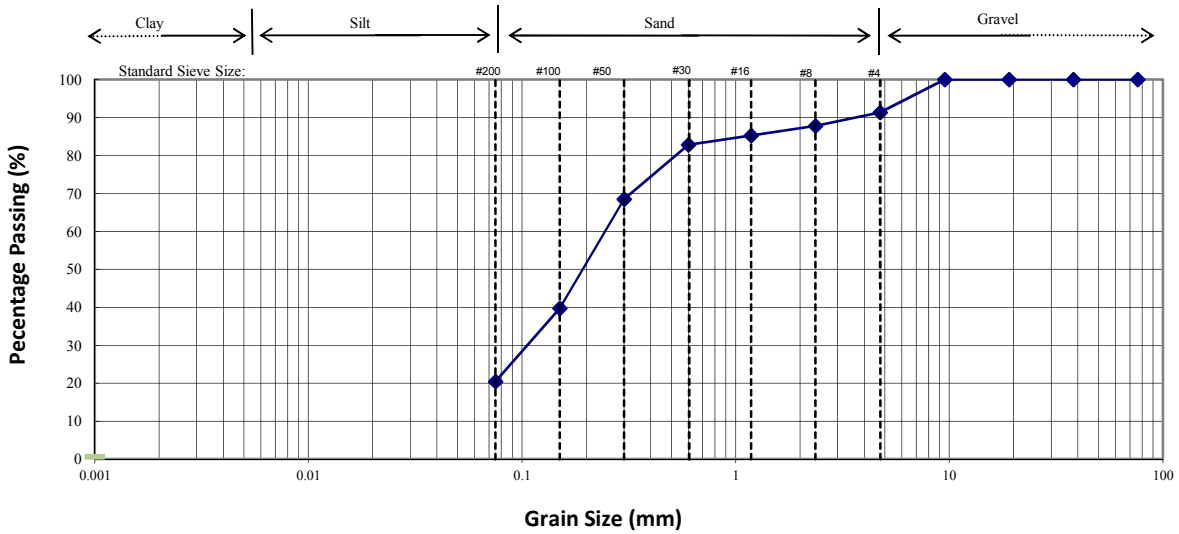
Client:	Shopoff LLC.
Project Name:	HB Seaside Magnolia
Job Number:	SHO-72233.4A
Date:	1/22/16
Boring Number:	B-5
Depth:	2.5 ft.
Soil Classififcation:	Silt (ML)
Tested By:	B D

PARTICLE-SIZE ANALYSIS OF SOILS

ASTM METHOD D422 (SIEVE ANALYSIS)

Boring/Depth	B-5	10 ft.	D_{10} (mm)	N/A
Total Weight (gm)	153.3		D_{30} (mm)	0.11
Dry Weight (gm)	121.5		D_{60} (mm)	0.26
Wet Sieve Weight (gm)	96.7		Cu	N/A
Initial Moisture (%)	26.2		Cc	N/A

Soil classified in accordance with ASTM D2487 (Unified Soil Classification System) and ASTM D422 (Sieve Analysis)



Sieve Size (in)	Sieve Size (mm)	Cumulative W_{dry} (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	10.5	8.6	91.4
#8	2.36	14.8	12.2	87.8
#16	1.18	17.9	14.7	85.3
#30	0.6	20.9	17.2	82.8
#50	0.3	38.3	31.5	68.5
#100	0.15	73.2	60.2	39.8
#200	0.075	96.7	79.6	20.4

EEI Geotechnical & Environmental Solutions

2195 Faraday Avenue, Suite K, Carlsbad CA 92008

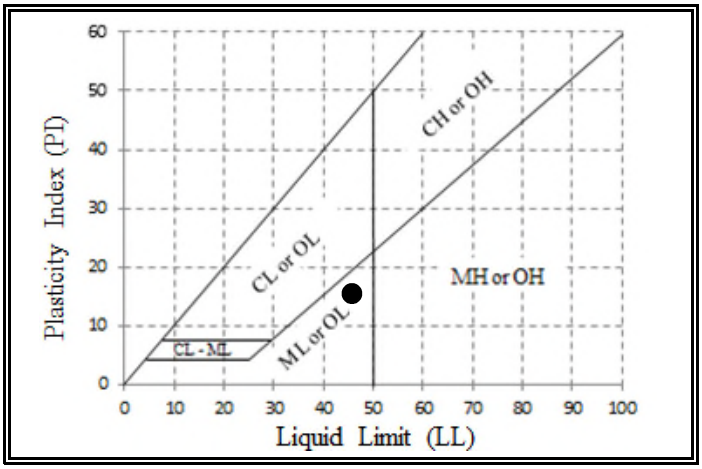
Client:	Shopoff LLC.
Project Name:	HB Seaside Magnolia
Job Number:	SHO-72233.4A
Date:	1/22/16
Boring Number:	B-5
Depth:	10 ft.
Soil Classififcation:	Silty Sand (SM)
Tested By:	B D

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX

ASTM METHOD D 4318

Sample	B-5 @ 2.5 ft.					
	Liquid Limit			Plastic Limit		
Test Number	1	2	3	1	2	2
Container Number	20	22	24	27	29	32
Weight of Container (g)	14.16	14.22	14.20	13.92	13.82	14.19
Wet Weight of Soil and Container (g)	23.66	24.60	23.95	19.90	19.56	20.02
Dry Weight of Soil and Container (g)	20.71	21.31	20.82	18.44	18.17	18.59
Number of Blows	30	26	18			
Moisture Content (%)	45.0	46.4	47.3	32.3	32.0	32.5

Liquid Limit =	**46.2**
Plastic Limit =	**32.3**
Plasticity Index =	**13.9**
Classification:	**ML**



EEI Geotechnical & Environmental Solutions

2195 Faraday Avenue, Suite K, Carlsbad, CA 92008

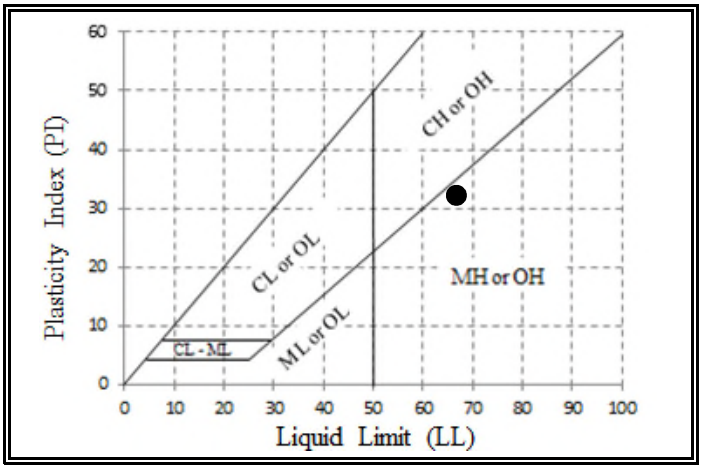
Client:	Shopoff LLC.
Project Name:	HB Seaside Magnolia
Job Number:	SHO-72233.4A
Date:	1/28/16
Boring Number:	B-5
Depth:	2.5 ft.
Soil Description:	Silt (ML)
Tested by:	B D

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX

ASTM METHOD D 4318

Sample	B-3 @ 0-5 ft.					
	Liquid Limit			Plastic Limit		
Test Number	1	2	3	1	2	2
Container Number	11	12	16	18	31	69
Weight of Container (g)	14.23	14.27	14.21	14.36	14.05	14.01
Wet Weight of Soil and Container (g)	24.31	23.85	23.32	20.23	19.93	19.86
Dry Weight of Soil and Container (g)	20.47	20.08	19.67	18.73	18.46	18.39
Number of Blows	35	28	23			
Moisture Content (%)	61.5	64.9	66.8	34.3	33.3	33.6

Liquid Limit =	**66.1**
Plastic Limit =	**33.7**
Plasticity Index =	**32.3**
Classification:	**MH**



EEI Geotechnical & Environmental Solutions

2195 Faraday Avenue, Suite K, Carlsbad, CA 92008

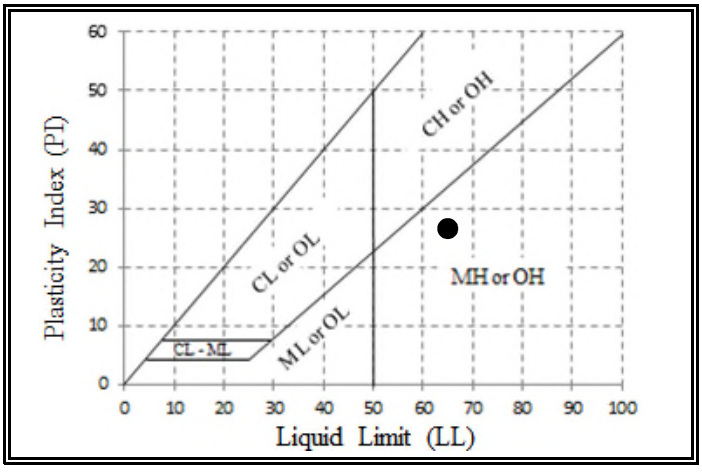
Client:	Shopoff LLC.
Project Name:	HB Seaside Magnolia
Job Number:	SHO-72233.4A
Date:	1/28/16
Boring Number:	B-3
Depth:	0-5 ft.
Soil Description:	Elastic Silt (MH)
Tested by:	B D

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX

ASTM METHOD D 4318

Sample	B-3 @ 2.5 ft.					
	Liquid Limit			Plastic Limit		
Test Number	1	2	3	1	2	2
Container Number	4	6	15	19	21	30
Weight of Container (g)	14.38	14.38	14.36	14.26	14.43	14.17
Wet Weight of Soil and Container (g)	23.09	22.83	23.45	20.08	20.10	19.86
Dry Weight of Soil and Container (g)	19.73	19.48	19.81	18.50	18.59	18.33
Number of Blows	34	25	16			
Moisture Content (%)	62.8	65.7	66.8	37.3	36.3	36.8

Liquid Limit =	**65.1**
Plastic Limit =	**36.8**
Plasticity Index =	**28.3**
Classification:	**MH**



EEI Geotechnical & Environmental Solutions

2195 Faraday Avenue, Suite K, Carlsbad, CA 92008

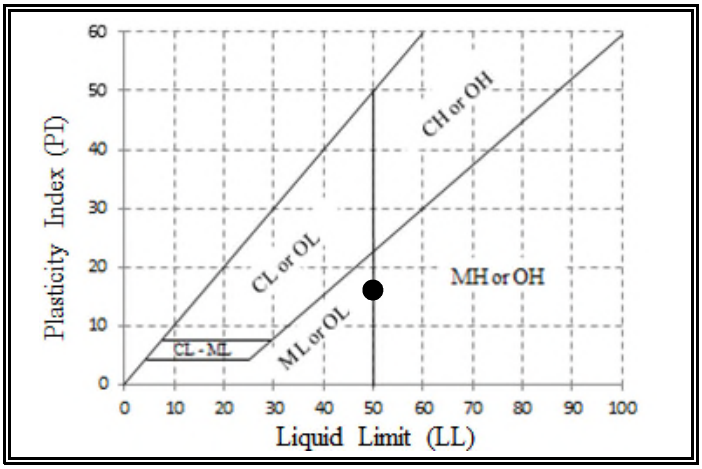
Client:	Shopoff LLC.
Project Name:	HB Seaside Magnolia
Job Number:	SHO-72233.4A
Date:	1/28/16
Boring Number:	B-3
Depth:	2.5 ft.
Soil Description:	Elastic Silt (MH)
Tested by:	B D

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX

ASTM METHOD D 4318

Sample	B-3 @ 5-5.8 ft.					
	Liquid Limit			Plastic Limit		
Test Number	1	2	3	1	2	2
Container Number	1	5	14	28	34	44
Weight of Container (g)	13.96	13.82	13.96	14.23	13.89	13.97
Wet Weight of Soil and Container (g)	25.73	25.11	24.14	20.23	19.93	19.86
Dry Weight of Soil and Container (g)	21.92	21.26	20.63	18.73	18.46	18.39
Number of Blows	29	21	16			
Moisture Content (%)	47.9	51.7	52.6	33.3	32.2	33.3

Liquid Limit =	**49.6**
Plastic Limit =	**32.9**
Plasticity Index =	**16.7**
Classification:	**MH**



EEI Geotechnical & Environmental Solutions

2195 Faraday Avenue, Suite K, Carlsbad, CA 92008

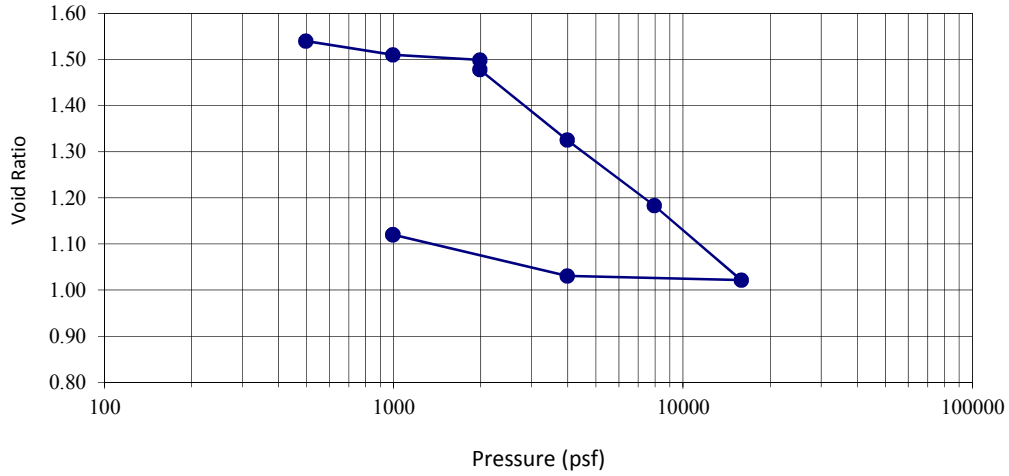
Client:	Shopoff LLC.
Project Name:	HB Seaside Magnolia
Job Number:	SHO-72233.4A
Date:	1/29/16
Boring Number:	B-3
Depth:	5-5.8 ft.
Soil Description:	Elastic Silt (MH)
Tested by:	B D

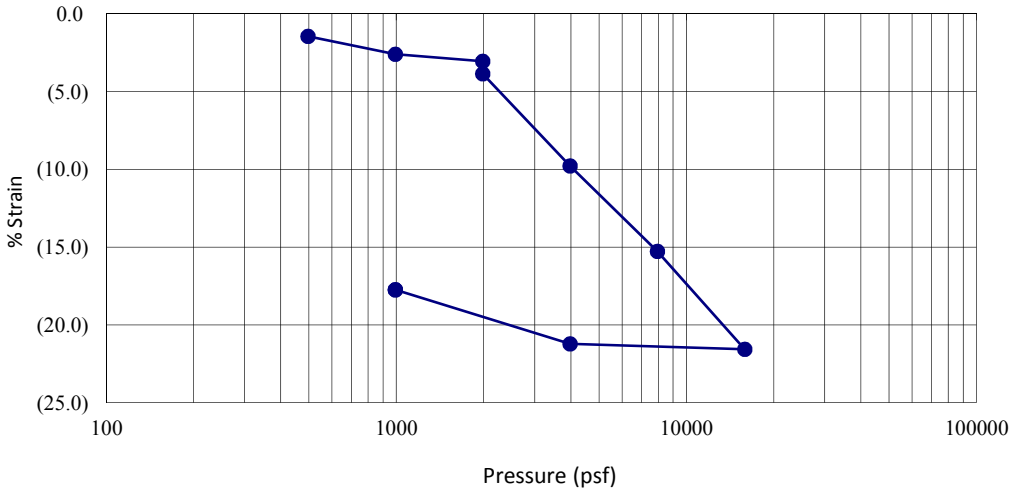
CONSOLIDATION-SWELL TEST (ASTM D2435)

JOB DATA	
Job No.:	SHO-72233.4A
Client:	Shopoff LLC
Project Name:	HB Seaside Magnolia
Date:	1/27/16
SAMPLE DATA	
Sample:	B-2 @ 5'8" - 6'
Sample Type:	Shelby Tube-Undisturbed
Remarks:	Sample Inundated Prior to Testing
Soil Type:	Dark Gray-Brown Silty Clay

EEI Geotechnical & Environmental Solutions

2195 Faraday, Suite K, Carlsbad, CA 92008





Swell Pressure:	1986
Percent Swell:	-0.84%
Comp. Index (Cc):	0.504
Consol. Index (Cr):	0.082

Specimen Diameter:	2.418	in.
Specimen Height:	1.00	in.
Overburden Pressure (Po):	500	psf
Preconsol. Pressure (Pp):	2000	psf

	Initial	Final
Moisture Content:	57.5%	40.9%
Void Ratio:	1.540	1.120
Saturation:	70%	96%
Dry Density (pcf):	65.4	79.5

CONSOLIDATION-SWELL TEST (ASTM D2435)

JOB DATA	
Job No.:	SHO-72233.4A
Client:	Shopoff LLC
Project Name:	HB Seaside Magnolia
Date:	1/27/16
SAMPLE DATA	
Sample:	B-3 @ 5'8" - 6'
Sample Type:	Shelby Tube-Undisturbed
Remarks:	Sample Inundated Prior to Testing
Soil Type:	Dark Gray-Brown Elastic Silt

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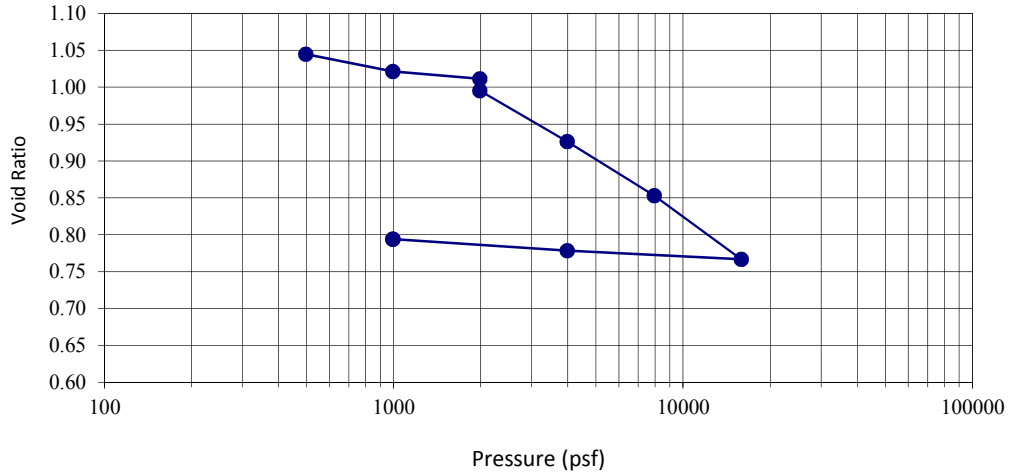
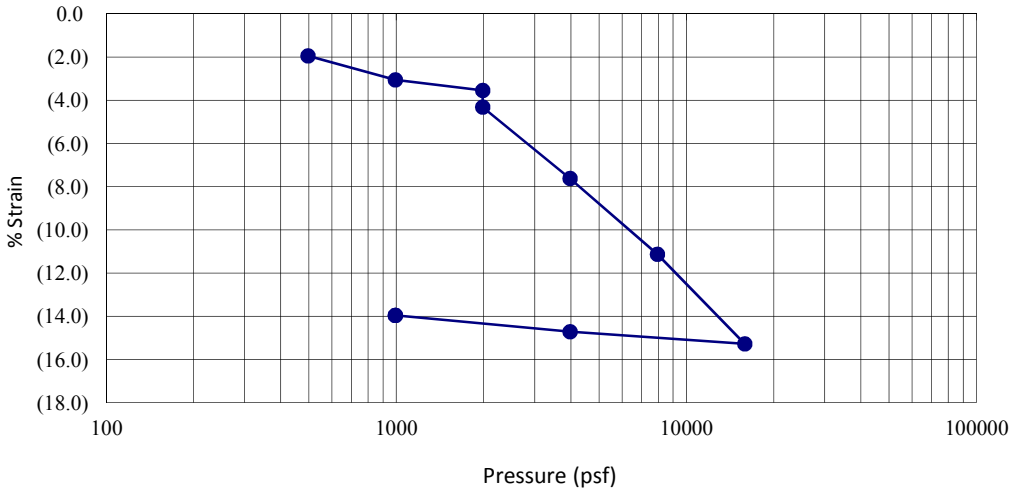




Swell Pressure:	1986	psf
Percent Swell:	-0.80%	
Comp. Index (Cc):	0.265	
Consol. Index (Cr):	0.023	

Specimen Diameter:	2.418	in.
Specimen Height:	1.00	in.
Overburden Pressure (Po):	500	psf
Preconsol. Pressure (Pp):	2000	psf

	Initial	Final
Moisture Content:	41.1%	30.0%
Void Ratio:	1.045	0.794
Saturation:	75%	98%
Dry Density (pcf):	80.8	93.9

DIRECT SHEAR TEST (ASTM D3080)

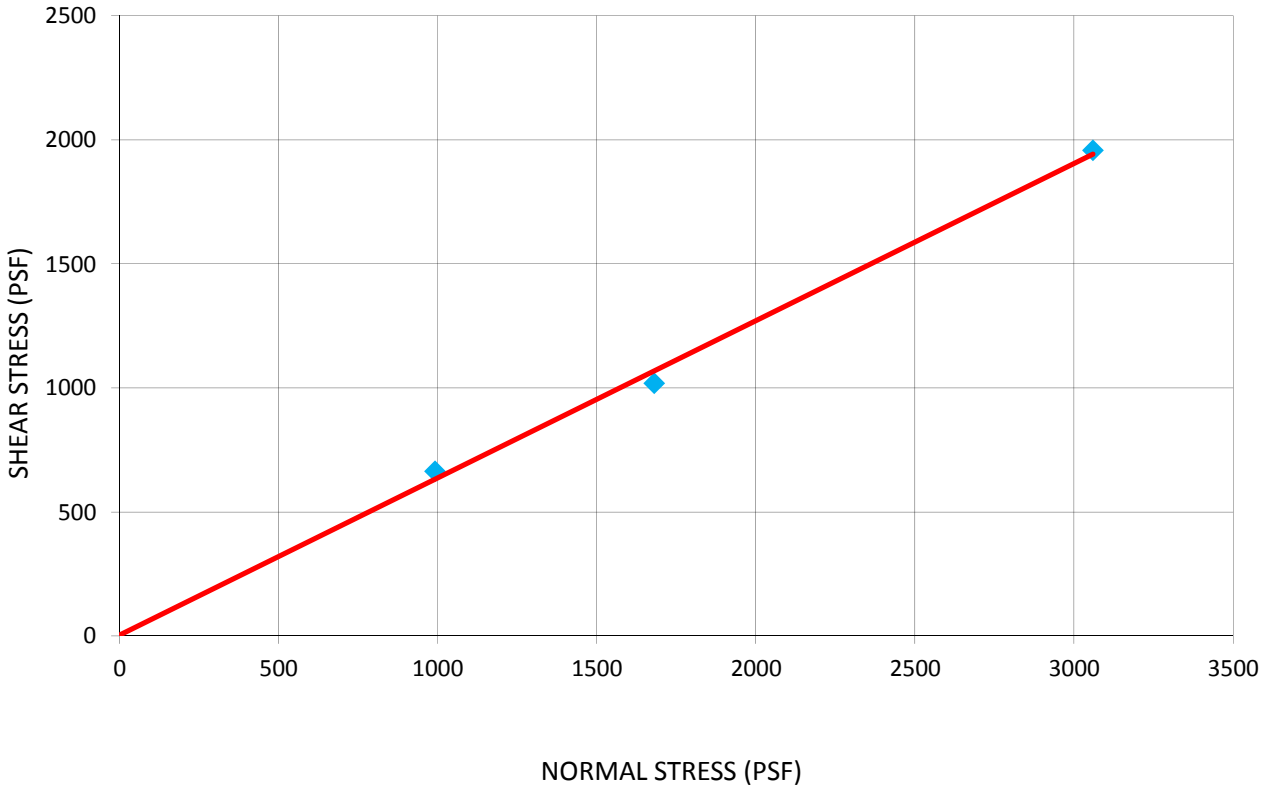
B-2 @ 6-6.4 ft.

Sample Data	
Remolded:	Natural
Remarks:	Sample inundated prior to testing
Soil Description:	Brown Silty Clay

Test Results		
Average Initial Moisture =	57.5	%
Average Dry Density =	62.9	pcf
Average Final Moisture =	61.0	%

Ultimate Strength	ϕ = 32 deg.	c = 3 psf

SHEAR TEST DIAGRAM



EEI Geotechnical & Environmental Solutions

2195 Faraday Avenue, Suite K, Carlsbad, CA 92008

Client:	Shopoff LLC.
Project Name:	HB Seaside Magnolia
Project No.:	SHO-72233.4A
Date:	1/29/16
Boring/Sample No:	B-2
Depth/Location:	6-6.4 ft.
Soil Description:	Brown Silty Clay
Tested by:	B D

DIRECT SHEAR TEST (ASTM D3080)

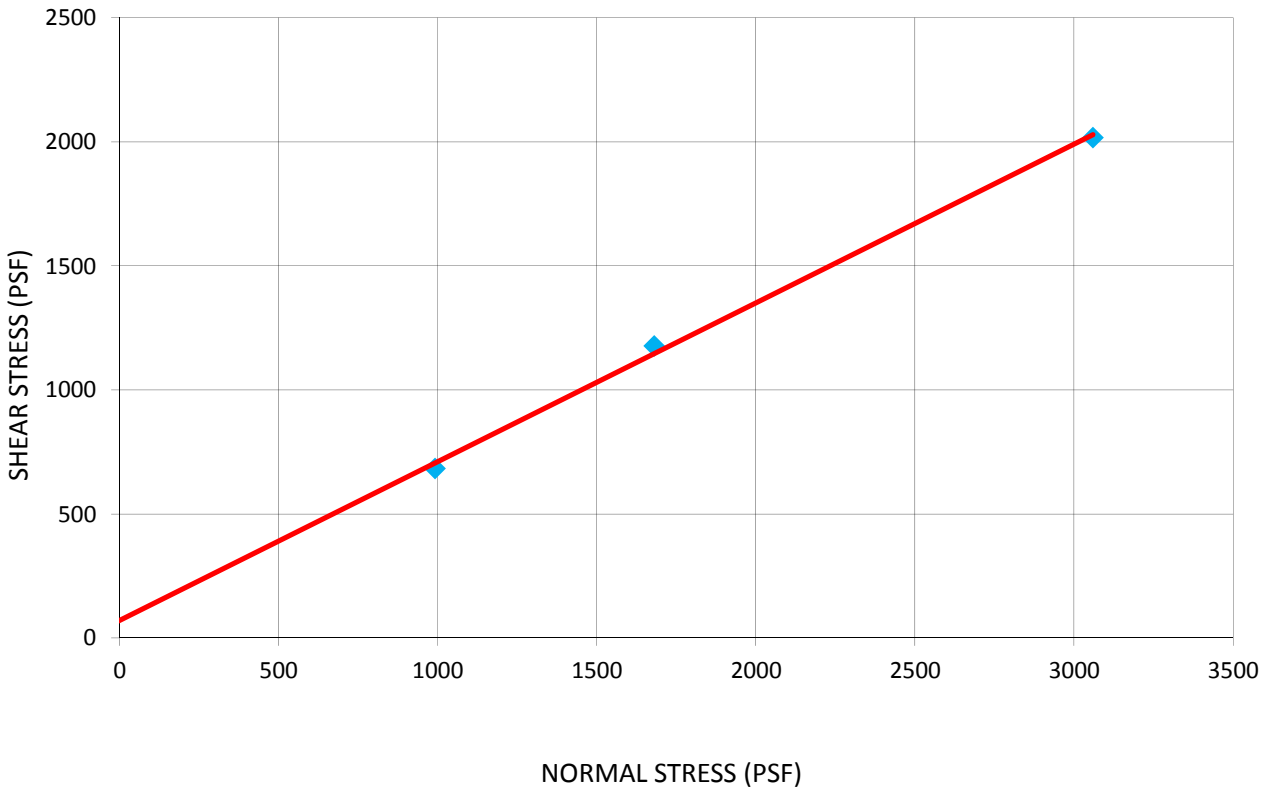
B-3 @ 6-6.4 ft.

Sample Data	
Remolded:	Natural
Remarks:	Sample inundated prior to testing
Soil Description:	Brown Elastic Silt

Test Results		
Average Initial Moisture =	41.1	%
Average Dry Density =	81.9	pcf
Average Final Moisture =	43.7	%

Ultimate Strength	ϕ = 33 deg.	c = 71 psf

SHEAR TEST DIAGRAM



EEI Geotechnical & Environmental Solutions

2195 Faraday Avenue, Suite K, Carlsbad, CA 92008

Client:	Shopoff LLC.
Project Name:	HB Seaside Magnolia
Project No.:	SHO-72233.4A
Date:	1/29/16
Boring/Sample No:	B-3
Depth/Location:	6-6.4 ft.
Soil Description:	Brown Elastic Silt
Tested by:	B D

L A B O R A T O R Y R E P O R T

Telephone (619) 425-1993 Fax 425-7917 Established 1928

C L A R K S O N L A B O R A T O R Y A N D S U P P L Y I N C.
350 Trousdale Dr. Chula Vista, Ca. 91910 www.clarksonlab.com
A N A L Y T I C A L A N D C O N S U L T I N G C H E M I S T S

Date: January 27, 2016
Purchase Order Number: SHO-72233-4
Sales Order Number: 29988
Account Number: EEI
To:
--
EEI Environmental Equalizers Inc
2195 Faraday Avenue Suite K
Carlsbad, CA 92008
Attention: Jeff Blake

Laboratory Number: SO5900-2 Customers Phone: 760-431-3747

Sample Designation:
--
One soil sample received on 01/25/16 at 12:20pm
taken from Hunhngton Beach Project# SHO-72233-4
marked as B-3 @ 0'-5' SM.

Analysis By California Test 643, 1999, Department of Transportation
Division of Construction, Method for Estimating the Service Life of
Steel Culverts.

pH 8.0

Water Added (ml)	Resistivity (ohm-cm)
10	1600
5	800
5	540
5	310
5	250
5	240
5	220
5	230
5	240

16 years to perforation for a 16 gauge metal culvert.
21 years to perforation for a 14 gauge metal culvert.
30 years to perforation for a 12 gauge metal culvert.
38 years to perforation for a 10 gauge metal culvert.
46 years to perforation for a 8 gauge metal culvert.

Water Soluble Sulfate Calif. Test 417 0.076% (760ppm)

Water Soluble Chloride Calif. Test 422 0.750% (7500ppm)

Laura Torres
LT/ram

L A B O R A T O R Y R E P O R T

Telephone (619) 425-1993 Fax 425-7917 Established 1928

C L A R K S O N L A B O R A T O R Y A N D S U P P L Y I N C.
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Laboratory Number: SO5900-1 Customers Phone: 760-431-3747

Sample Designation:
--
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marked as B-2 @ 0'-5' SM.

Analysis By California Test 643, 1999, Department of Transportation
Division of Construction, Method for Estimating the Service Life of
Steel Culverts.

pH 8.0

Water Added (ml)	Resistivity (ohm-cm)
10	960
5	410
5	220
5	170
5	150
5	150
5	140
5	150
5	170

14 years to perforation for a 16 gauge metal culvert.
18 years to perforation for a 14 gauge metal culvert.
25 years to perforation for a 12 gauge metal culvert.
31 years to perforation for a 10 gauge metal culvert.
38 years to perforation for a 8 gauge metal culvert.

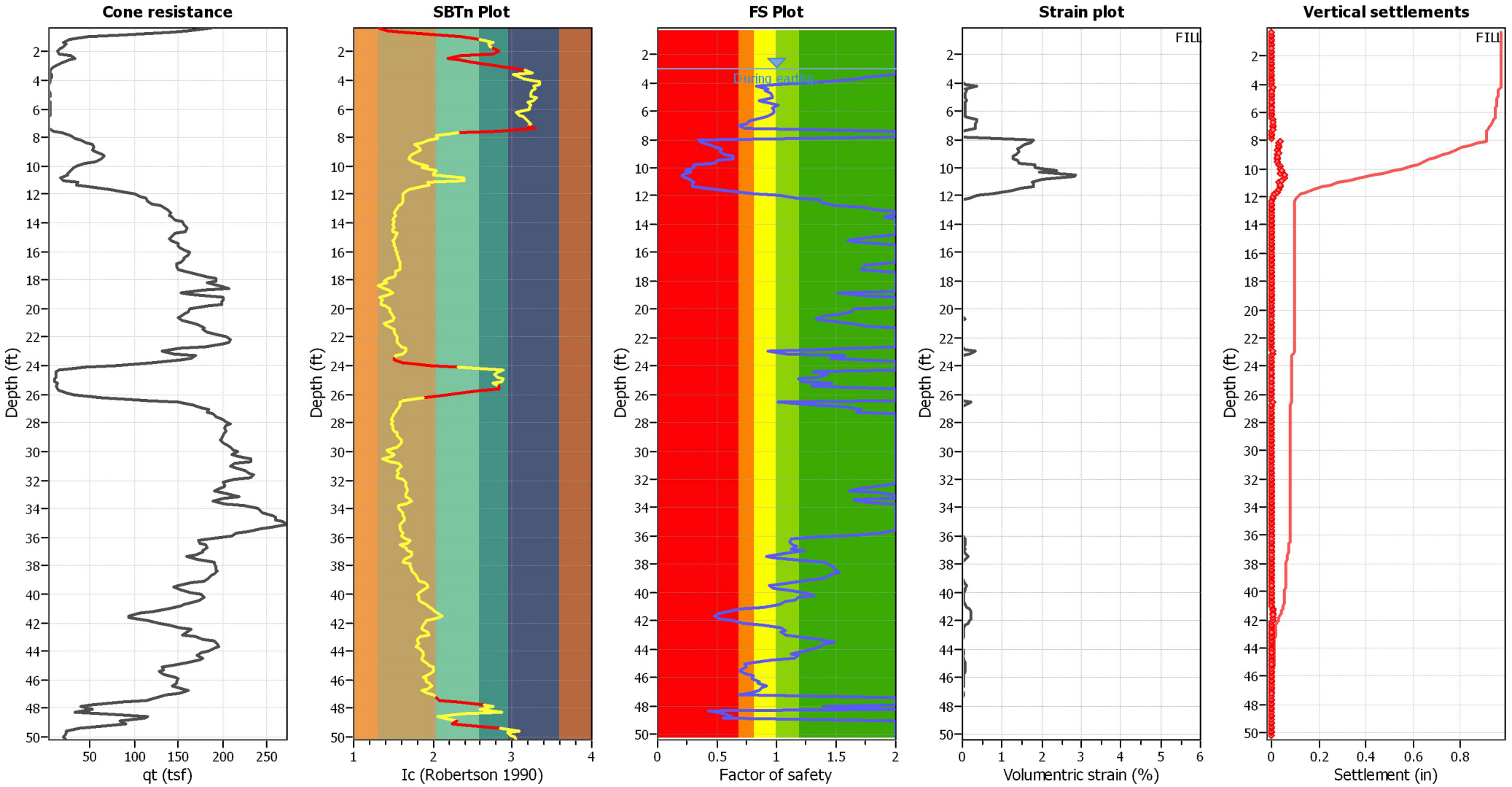
Water Soluble Sulfate Calif. Test 417 0.100% (1000ppm)

Water Soluble Chloride Calif. Test 422 0.380% (3800ppm)

Laura Torres
LT/ram

APPENDIX C
LIQUEFACTION ANALYSIS

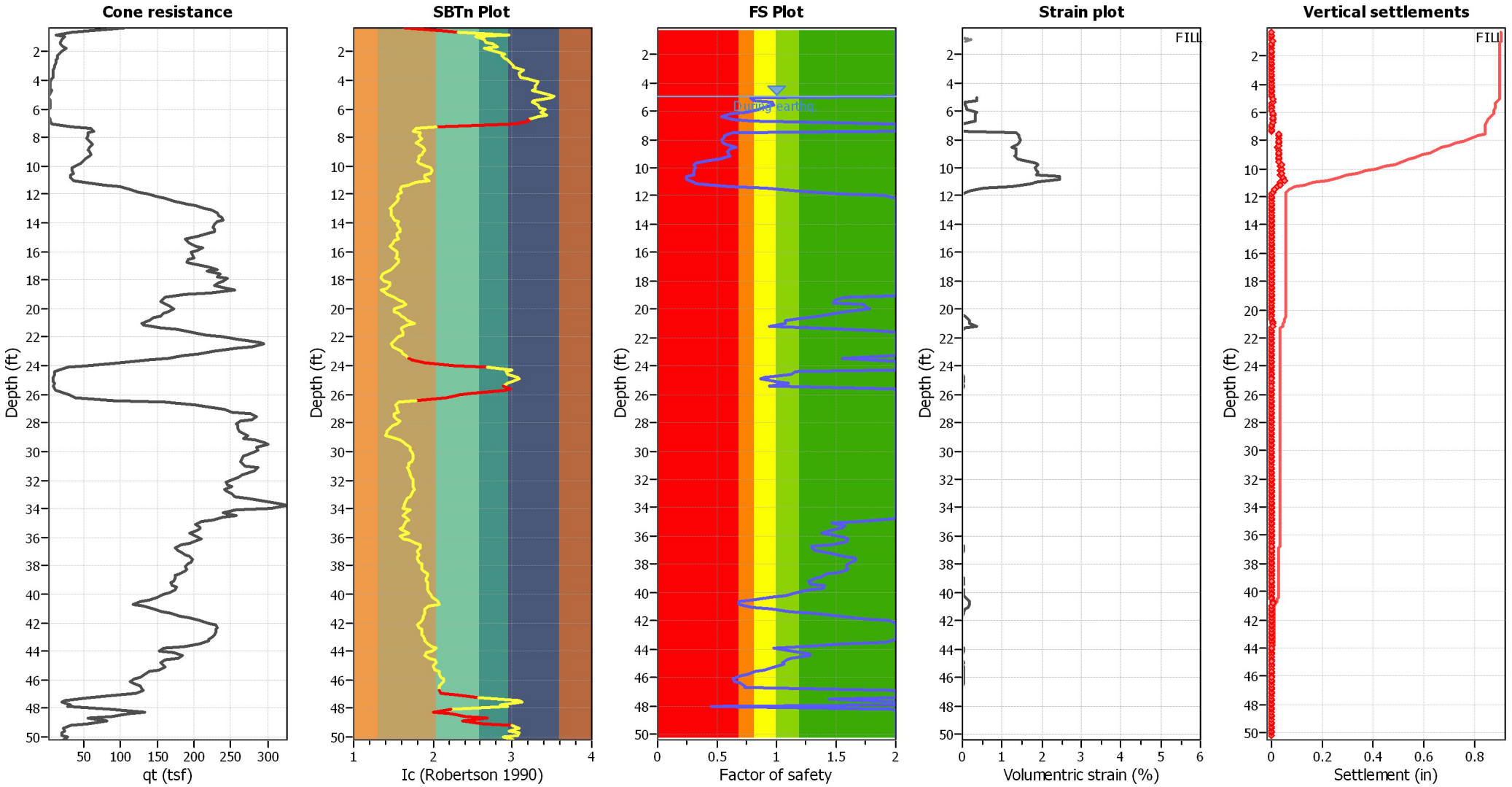
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

Estimation of post-earthquake settlements



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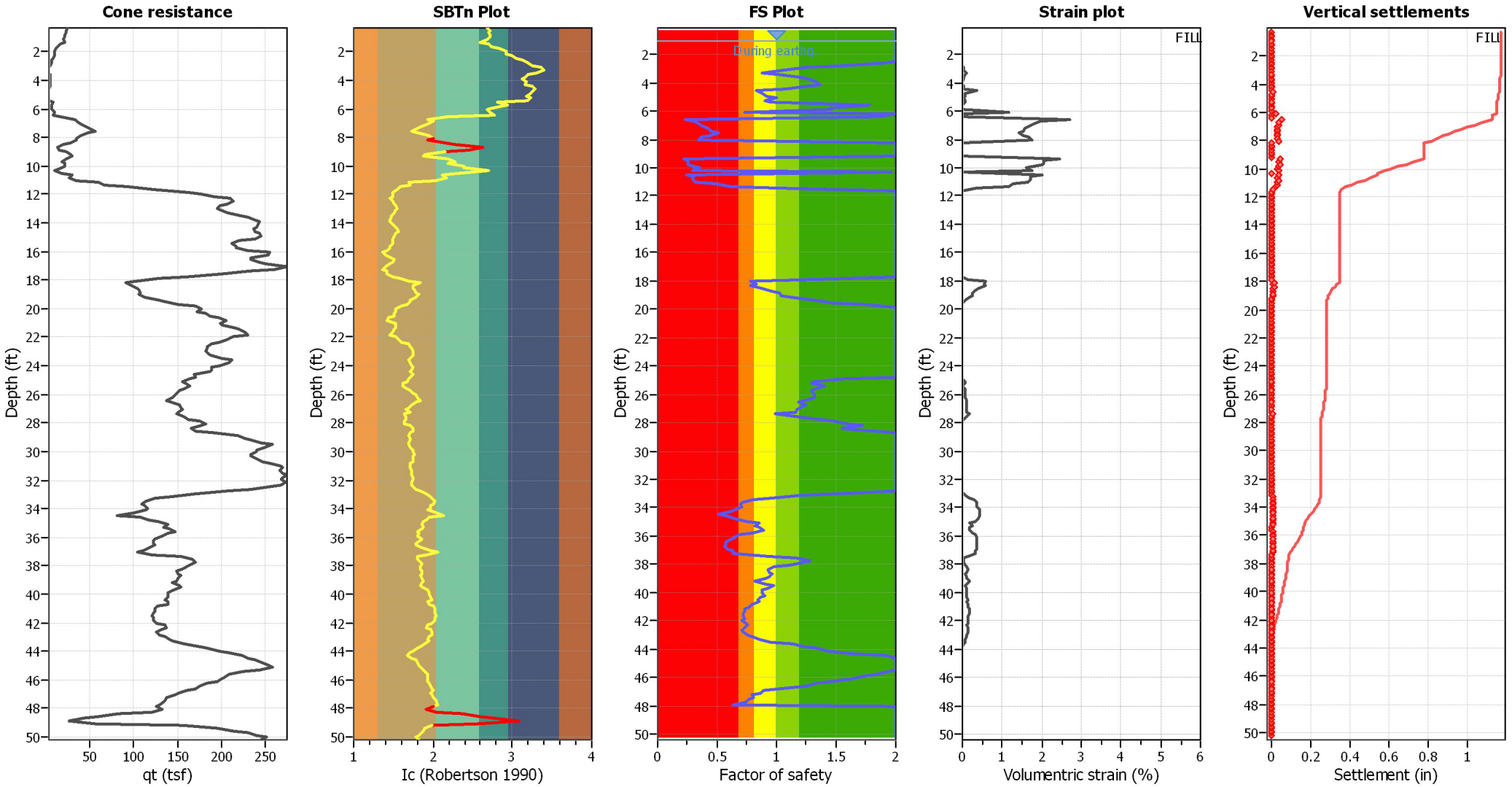
Estimation of post-earthquake settlements



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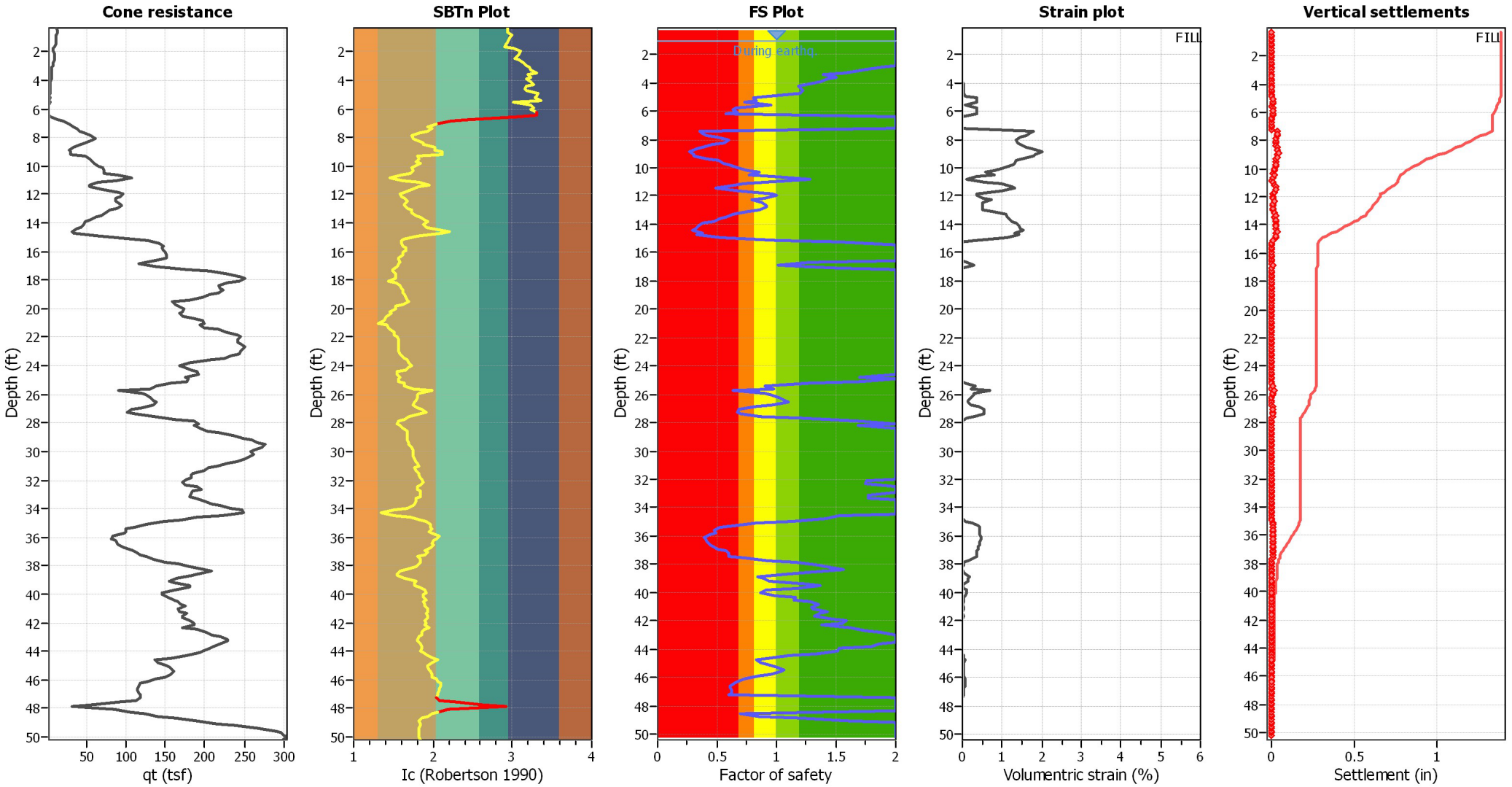

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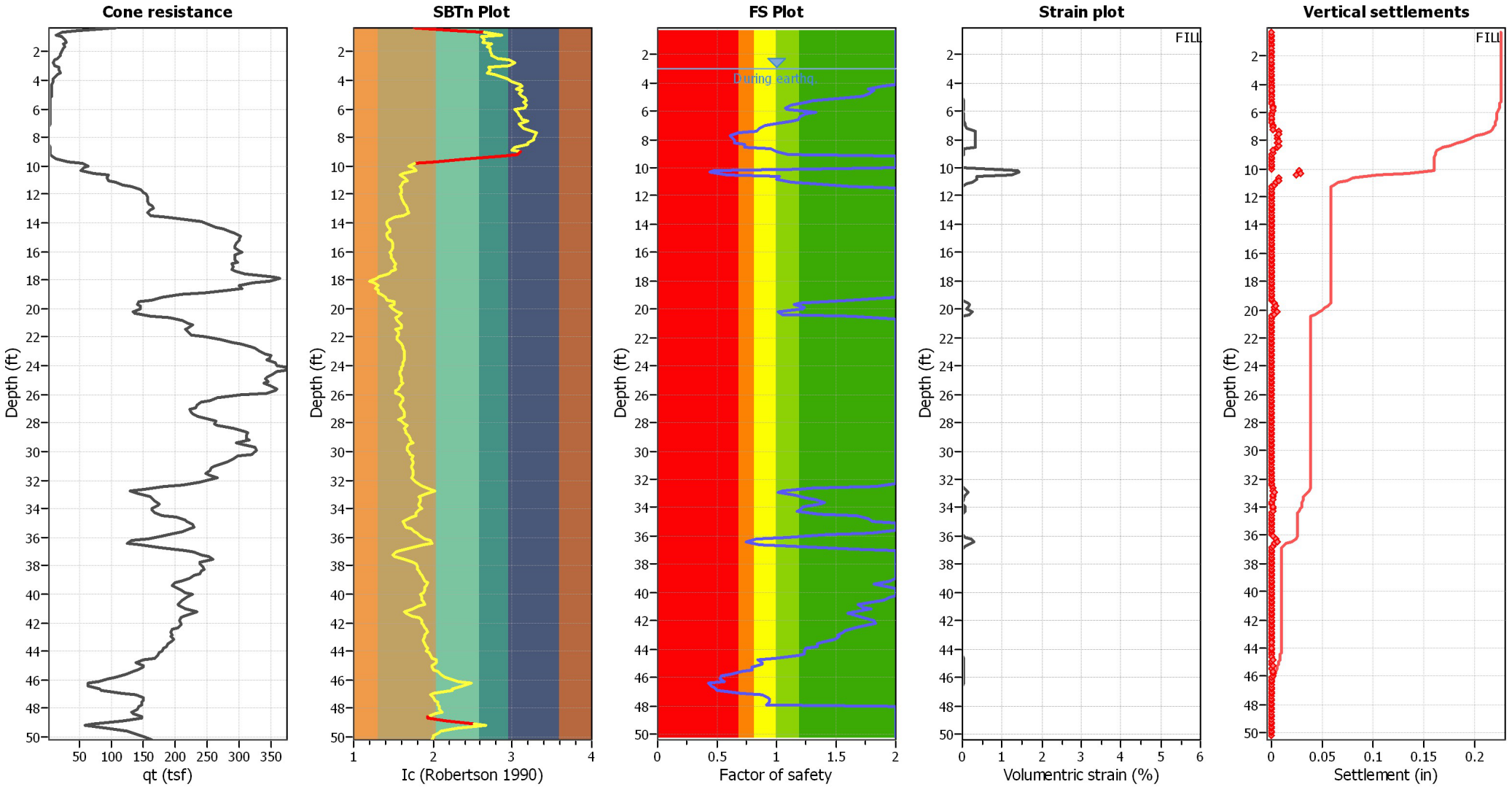

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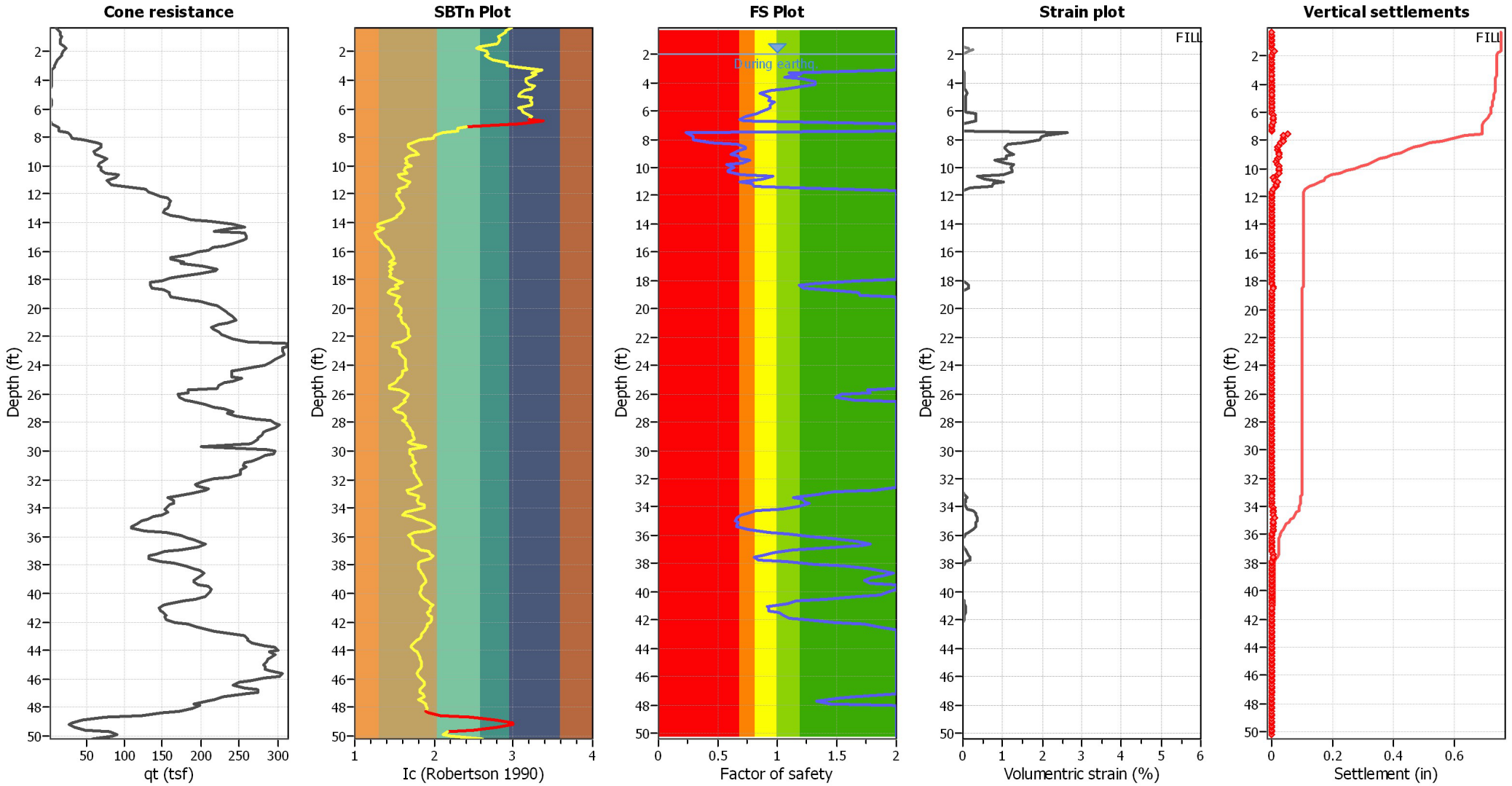

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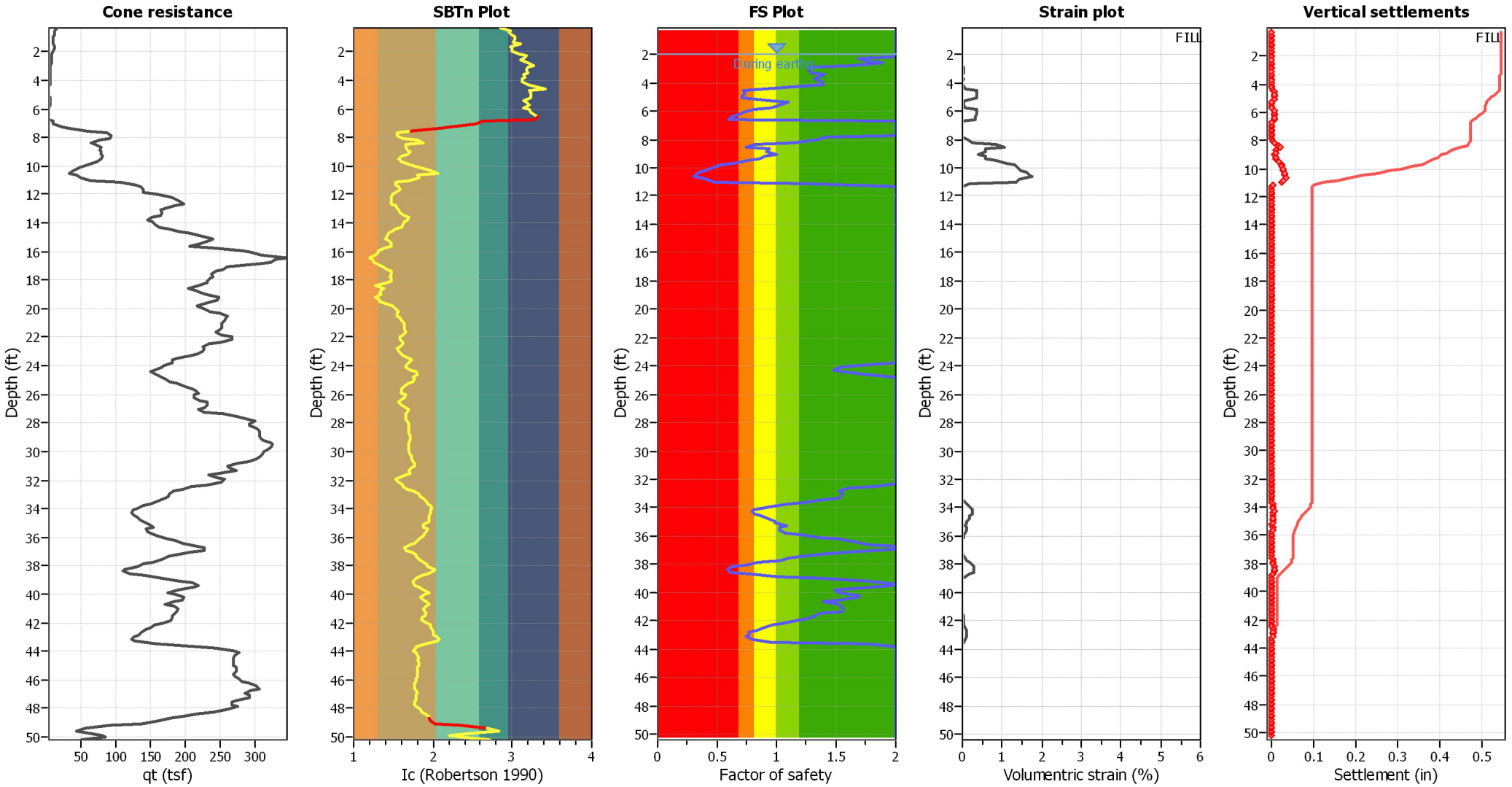

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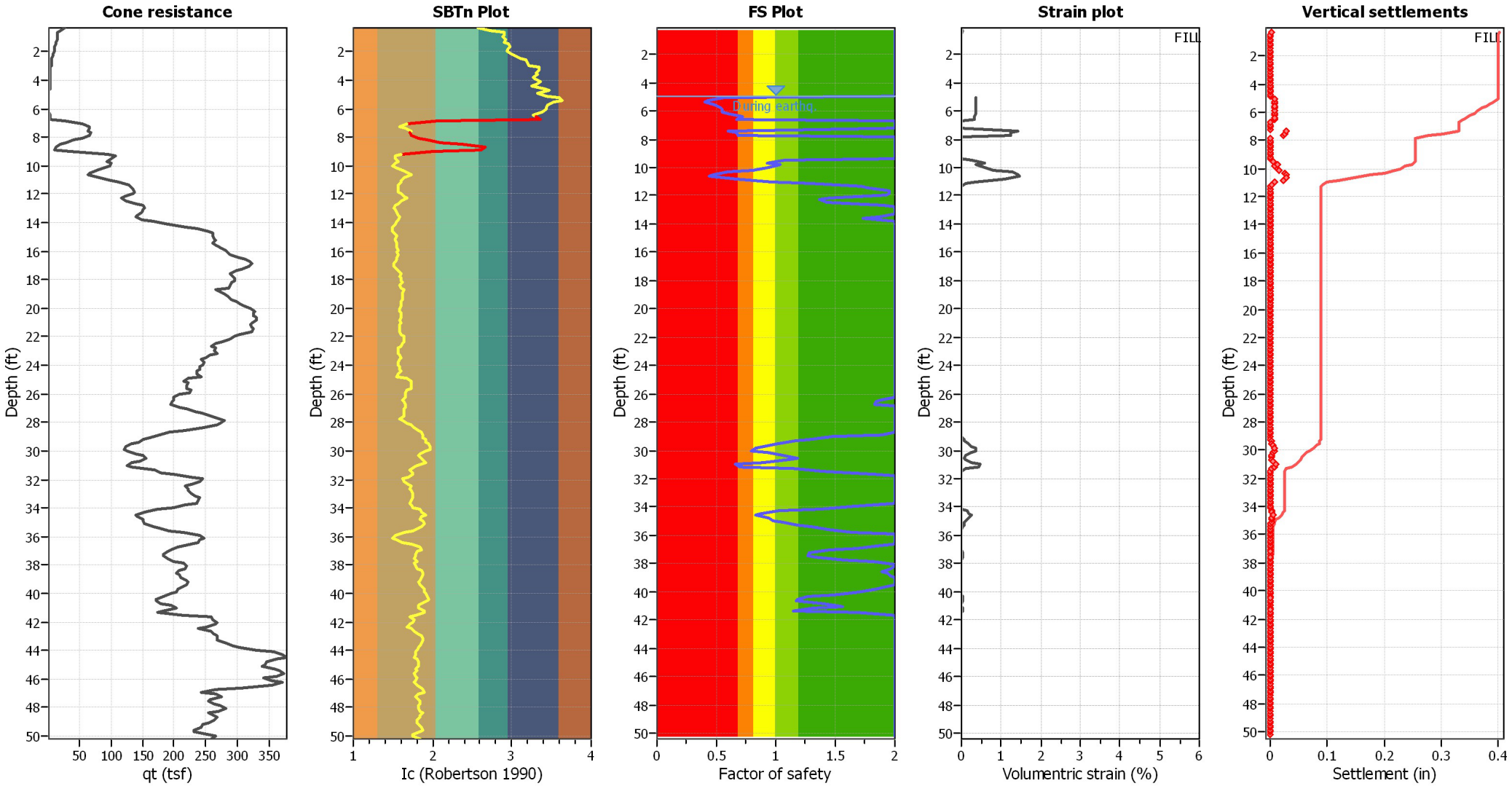

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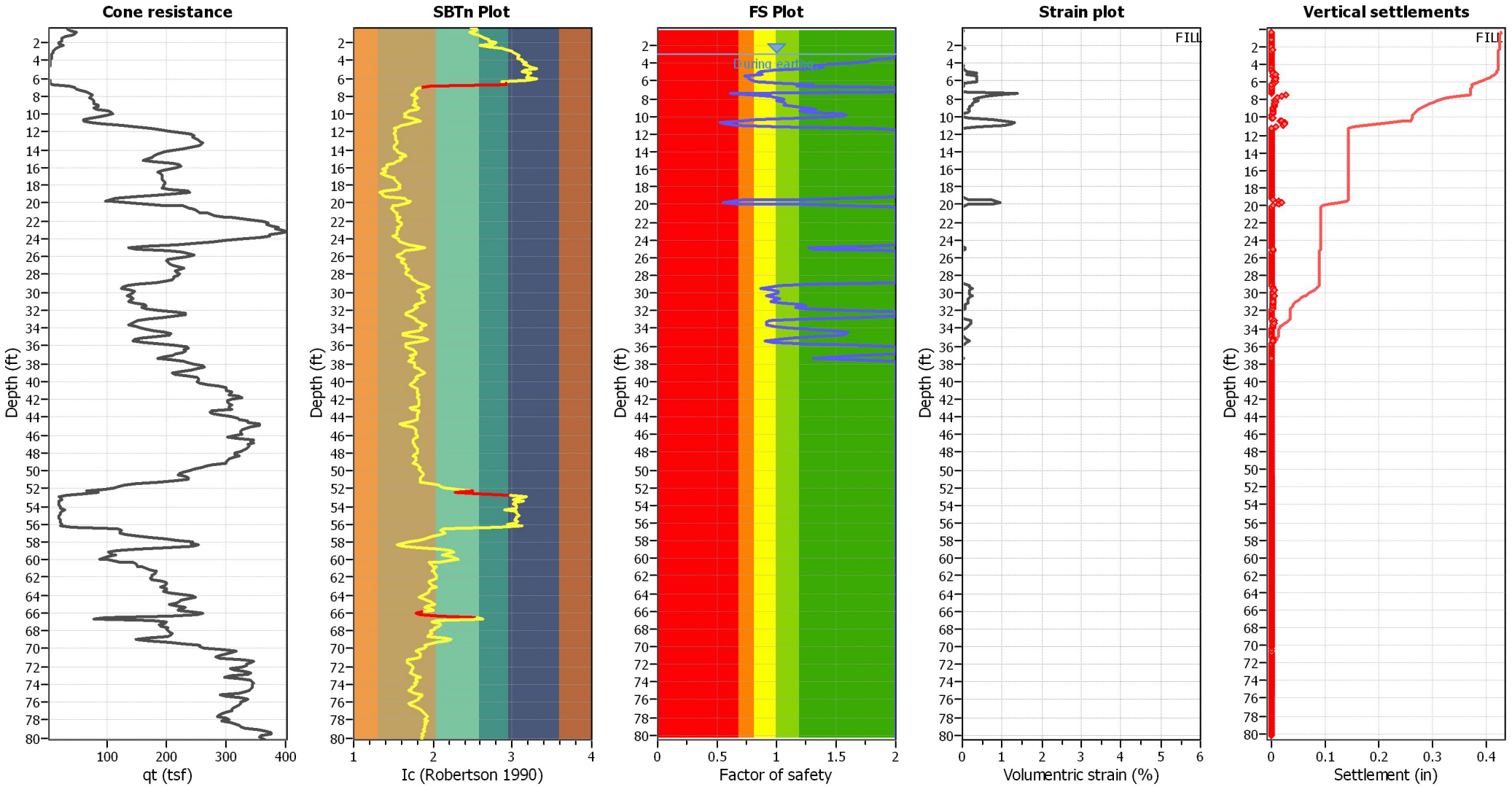

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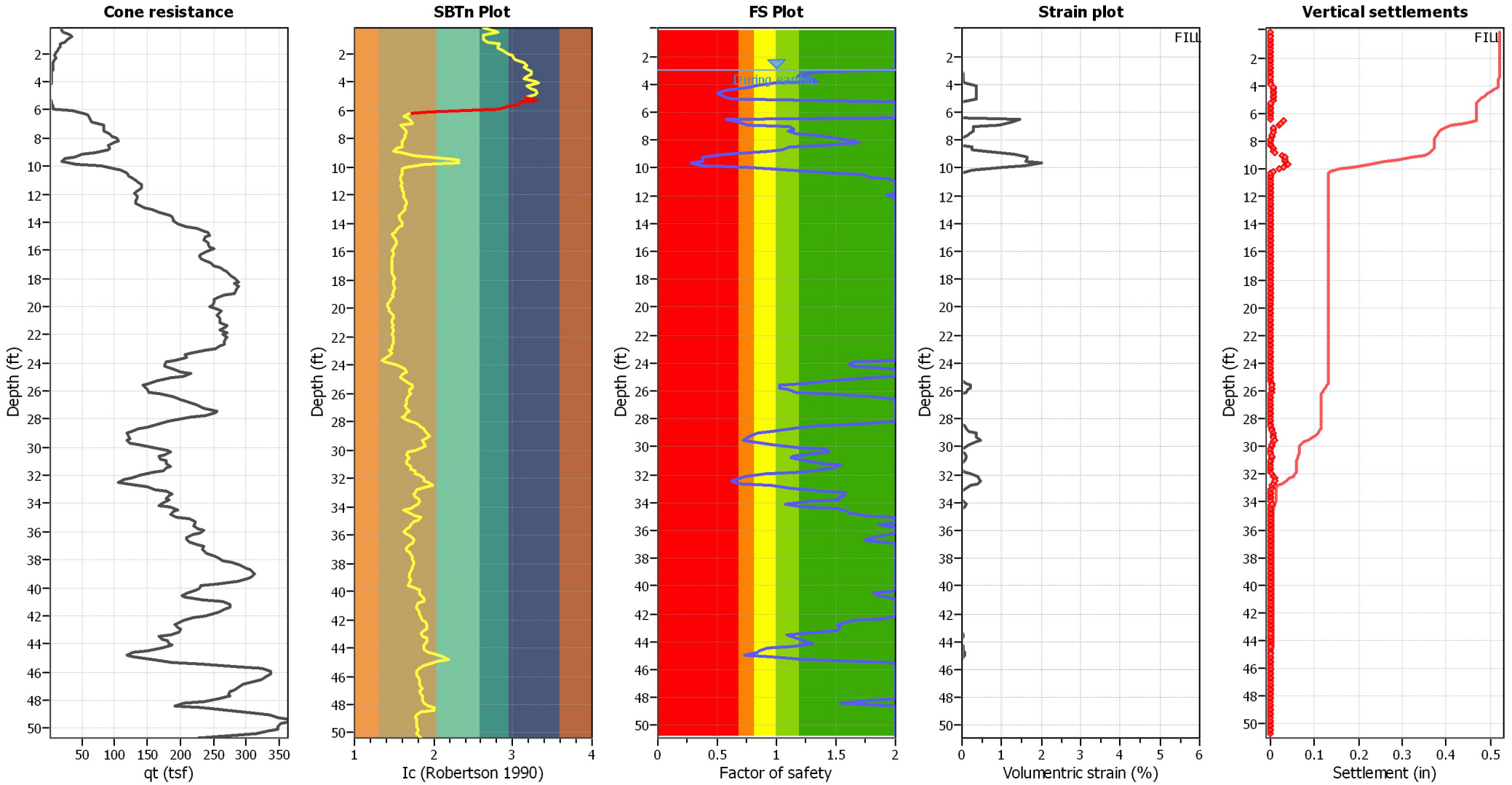

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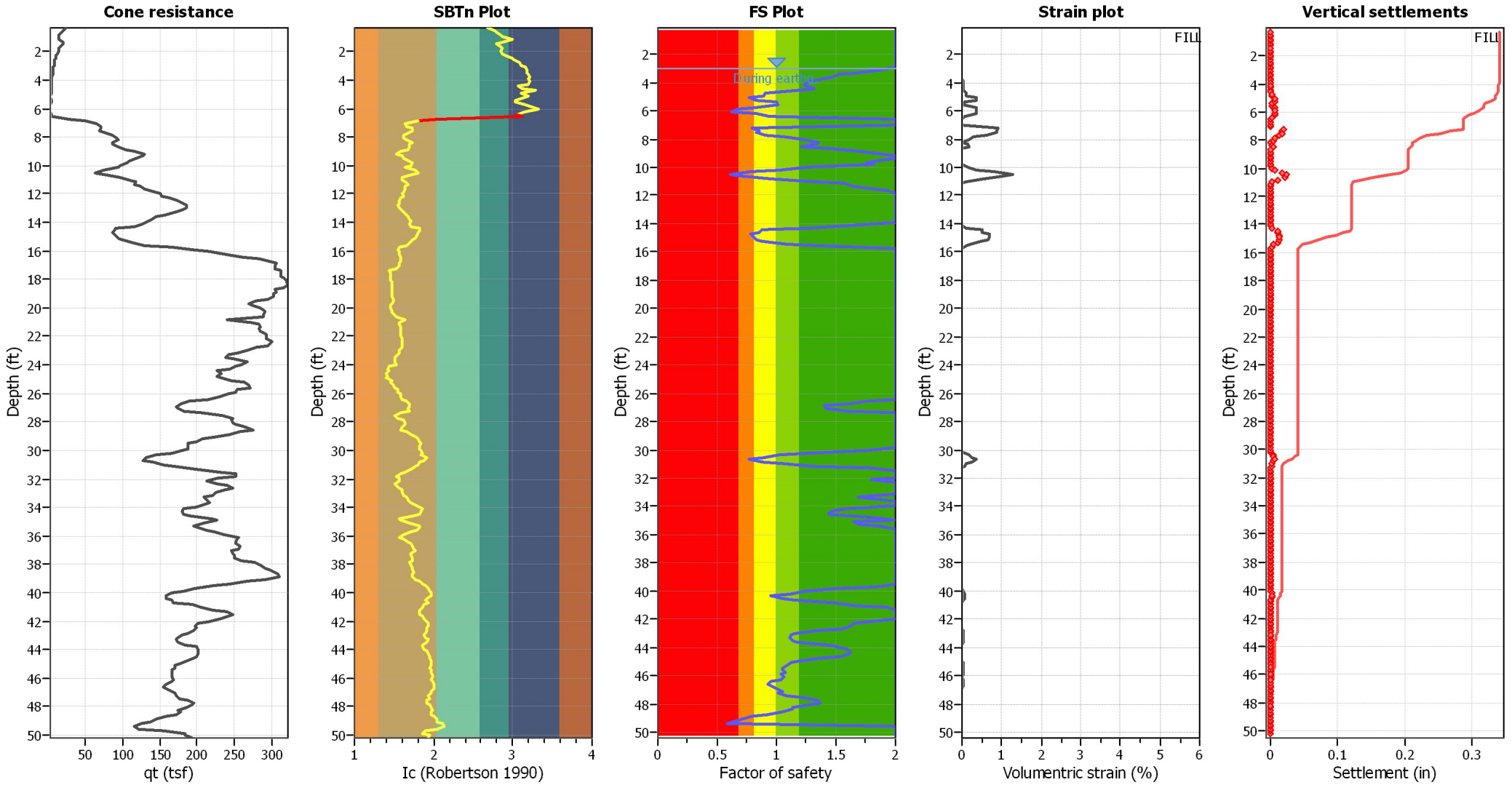

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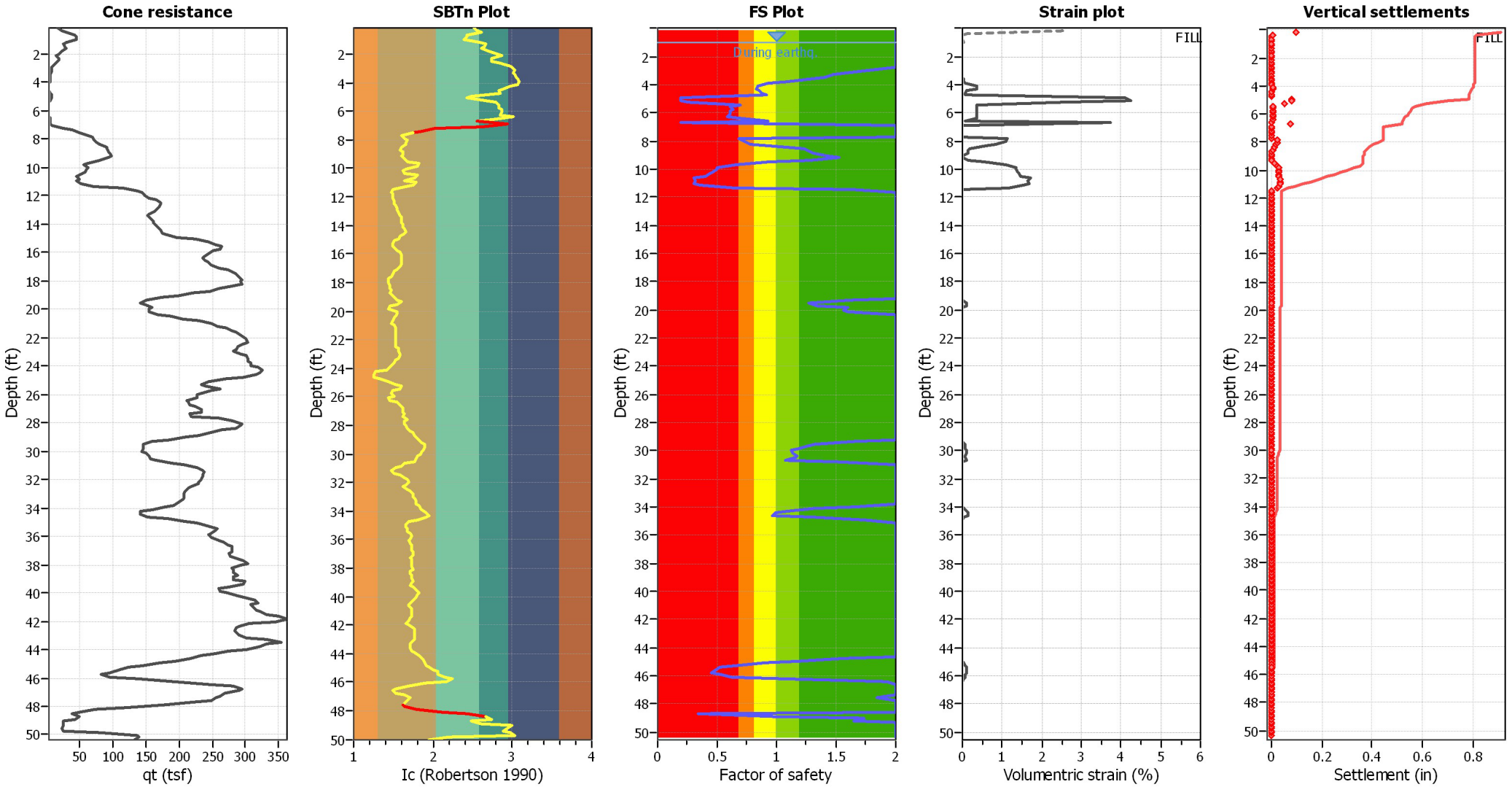
Volumentric strain:	Post-liquefaction volumentric strain

Estimation of post-earthquake settlements



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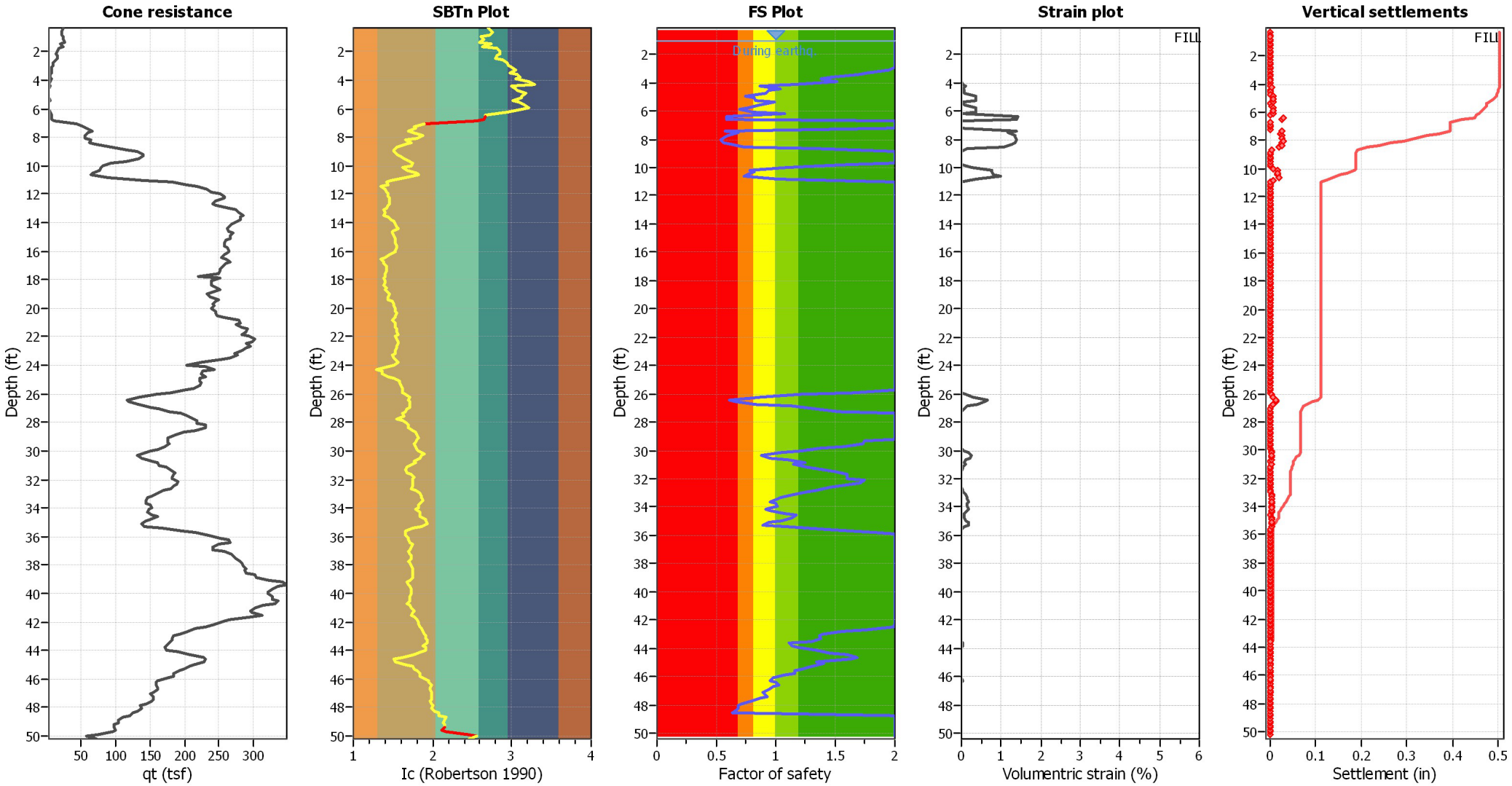
Estimation of post-earthquake settlements



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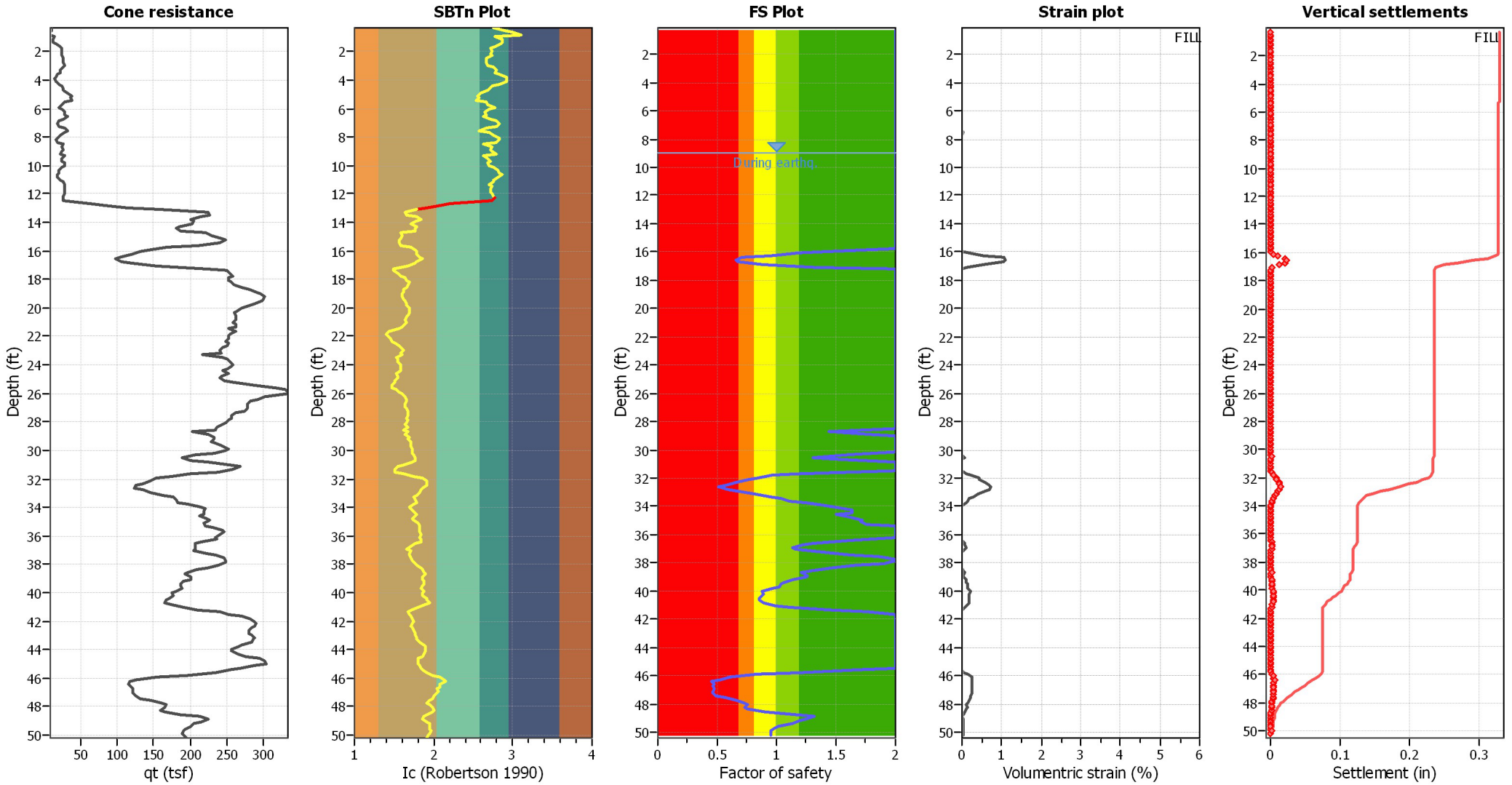
Volumentric strain:	Post-liquefaction volumentric strain

Estimation of post-earthquake settlements



Abbreviations

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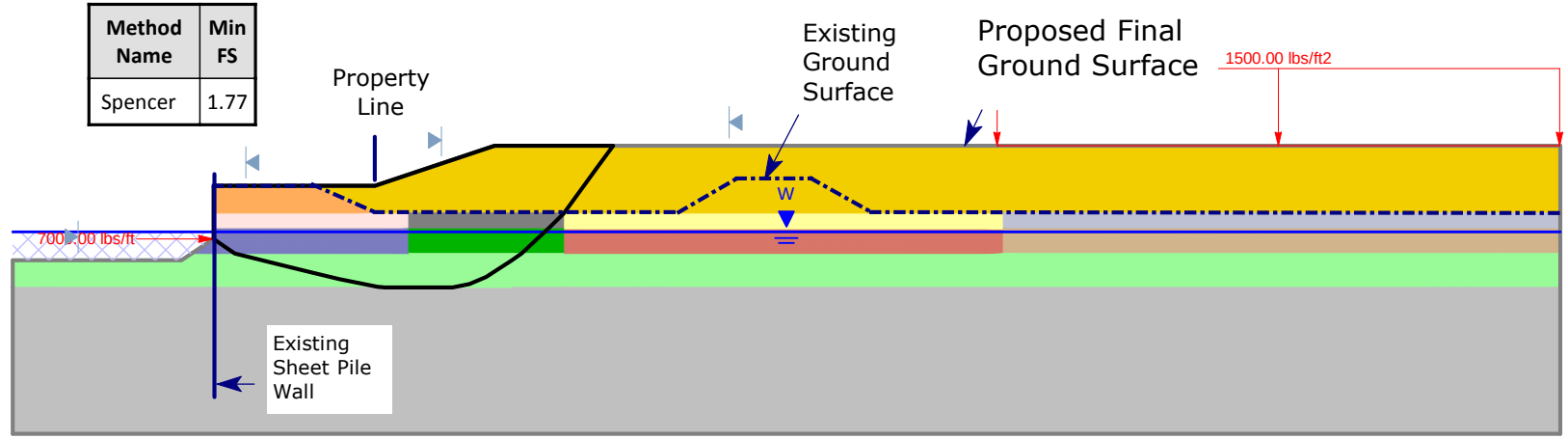
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

APPENDIX D
SEISMIC SLOPE STABILITY ANALYSIS

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
Proposed Fill		125	Mohr-Coulomb	100	33	Water Surface	Automatically Calculated
Existing Clayey Fill-1		105	Mohr-Coulomb	1100	0	Water Surface	Automatically Calculated
Existing Wall Fill		120	Mohr-Coulomb	0	32	Water Surface	Automatically Calculated
Existing Clayey Alluvium-1		105	Mohr-Coulomb	500	0	Water Surface	Automatically Calculated
Existing Liquefiable Sandy Alluvium		100	Mohr-Coulomb	220	0	Water Surface	Automatically Calculated
Existing Sandy Alluvium		120	Mohr-Coulomb	50	35	Water Surface	Automatically Calculated
Existing Clayey Fill-2		110	Mohr-Coulomb	1300	0	Water Surface	Automatically Calculated
Existing Clay Alluvium-2		105	Mohr-Coulomb	700	0	Water Surface	Automatically Calculated
Existing Clayey Fill-3		115	Mohr-Coulomb	1400	0	Water Surface	Automatically Calculated
Existing Clayey Alluvium-3		110	Mohr-Coulomb	800	0	Water Surface	Automatically Calculated
Existing Clayey Fill-4		115	Mohr-Coulomb	1700	0	Water Surface	Automatically Calculated
Existing Clayey Alluvium-4		110	Mohr-Coulomb	1100	0	Water Surface	Automatically Calculated

Method Name	Min FS
Spencer	1.77

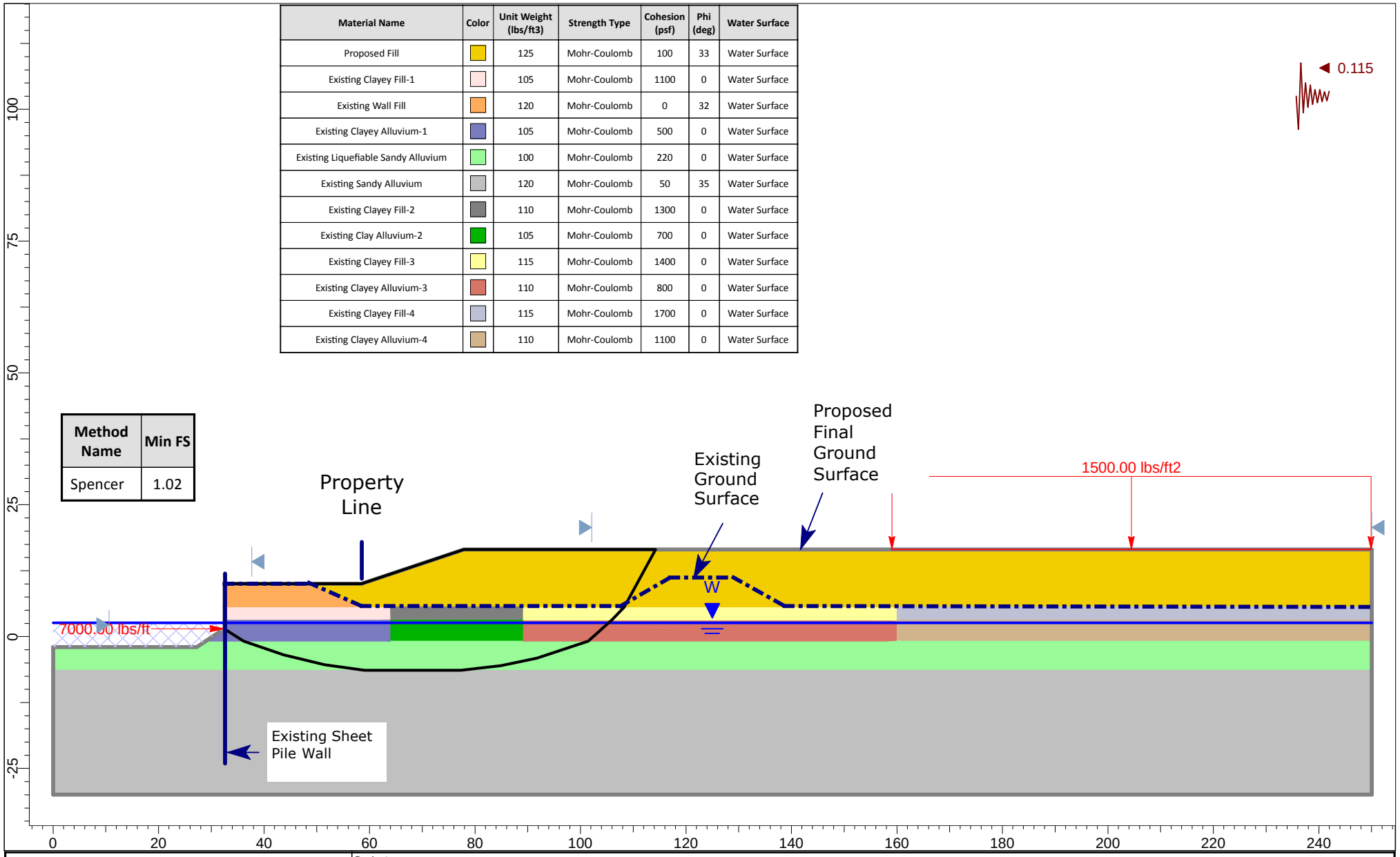


EEI Geotechnical & Environmental Solutions

SLIDEINTERPRET 7.011

Project	HB Seaside Magnolia - EEI Project Number SHO-72233.4A		
Analysis Description	Seismic Slope Stability Analysis without Ground Improvement - Section A-A'		
Drawn By	Maurice Amendolagine	Scale 1:359	Company EEI Geotechnical and Environmental Solutions
Date	1/13/2016, 3:55:28 PM		File Name HB Seaside Seismic Stability No Ground Imp.slim

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface
Proposed Fill		125	Mohr-Coulomb	100	33	Water Surface
Existing Clayey Fill-1		105	Mohr-Coulomb	1100	0	Water Surface
Existing Wall Fill		120	Mohr-Coulomb	0	32	Water Surface
Existing Clayey Alluvium-1		105	Mohr-Coulomb	500	0	Water Surface
Existing Liquefiable Sandy Alluvium		100	Mohr-Coulomb	220	0	Water Surface
Existing Sandy Alluvium		120	Mohr-Coulomb	50	35	Water Surface
Existing Clayey Fill-2		110	Mohr-Coulomb	1300	0	Water Surface
Existing Clay Alluvium-2		105	Mohr-Coulomb	700	0	Water Surface
Existing Clayey Fill-3		115	Mohr-Coulomb	1400	0	Water Surface
Existing Clayey Alluvium-3		110	Mohr-Coulomb	800	0	Water Surface
Existing Clayey Fill-4		115	Mohr-Coulomb	1700	0	Water Surface
Existing Clayey Alluvium-4		110	Mohr-Coulomb	1100	0	Water Surface

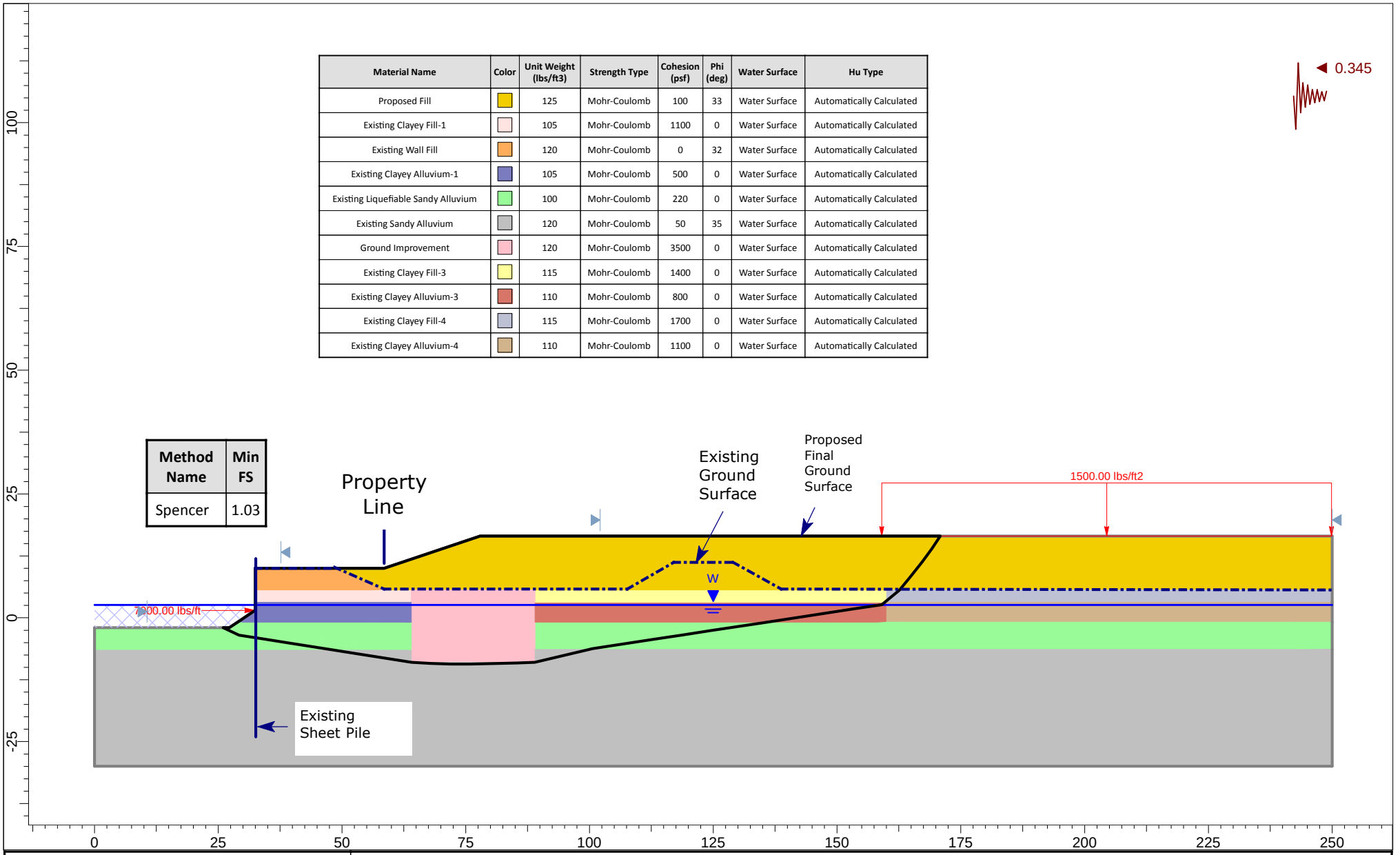


EEI Geotechnical & Environmental Solutions

SLIDEINTERPRET 7.011

Project	HB Seaside Magnolia - EEI Project Number SHO-72233.4A		
Analysis Description	Seismic Deformation Slope Stability Analysis without Ground Improvement - Section A-A'		
Drawn By	Maurice Amendolagine	Scale 1:302	Company EEI Geotechnical and Environmental Solutions
Date	1/13/2016, 3:55:28 PM		File Name HB Seaside Seismic No Ground Imp.slim

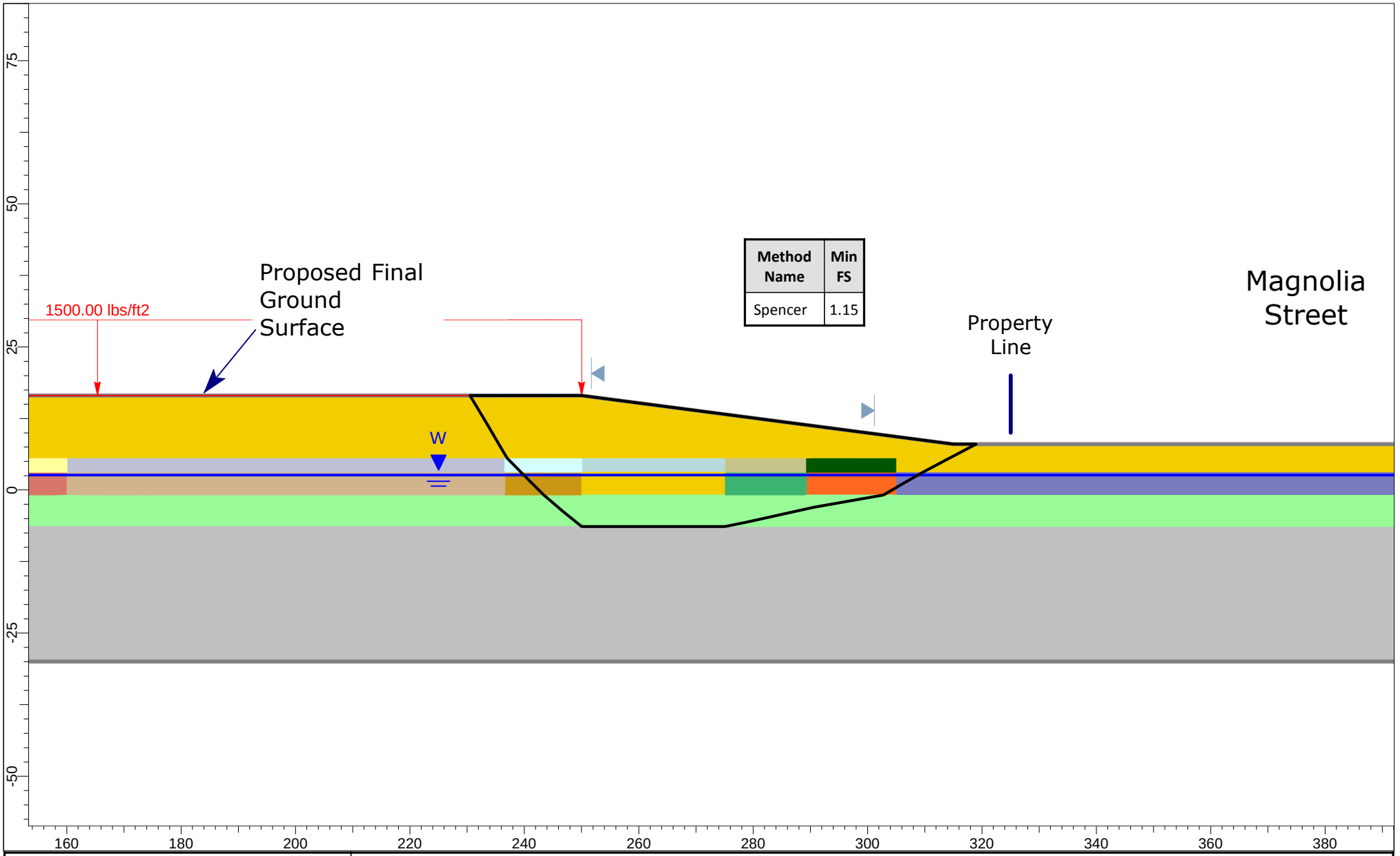
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
Proposed Fill		125	Mohr-Coulomb	100	33	Water Surface	Automatically Calculated
Existing Clayey Fill-1		105	Mohr-Coulomb	1100	0	Water Surface	Automatically Calculated
Existing Wall Fill		120	Mohr-Coulomb	0	32	Water Surface	Automatically Calculated
Existing Clayey Alluvium-1		105	Mohr-Coulomb	500	0	Water Surface	Automatically Calculated
Existing Liquefiable Sandy Alluvium		100	Mohr-Coulomb	220	0	Water Surface	Automatically Calculated
Existing Sandy Alluvium		120	Mohr-Coulomb	50	35	Water Surface	Automatically Calculated
Ground Improvement		120	Mohr-Coulomb	3500	0	Water Surface	Automatically Calculated
Existing Clayey Fill-3		115	Mohr-Coulomb	1400	0	Water Surface	Automatically Calculated
Existing Clayey Alluvium-3		110	Mohr-Coulomb	800	0	Water Surface	Automatically Calculated
Existing Clayey Fill-4		115	Mohr-Coulomb	1700	0	Water Surface	Automatically Calculated
Existing Clayey Alluvium-4		110	Mohr-Coulomb	1100	0	Water Surface	Automatically Calculated



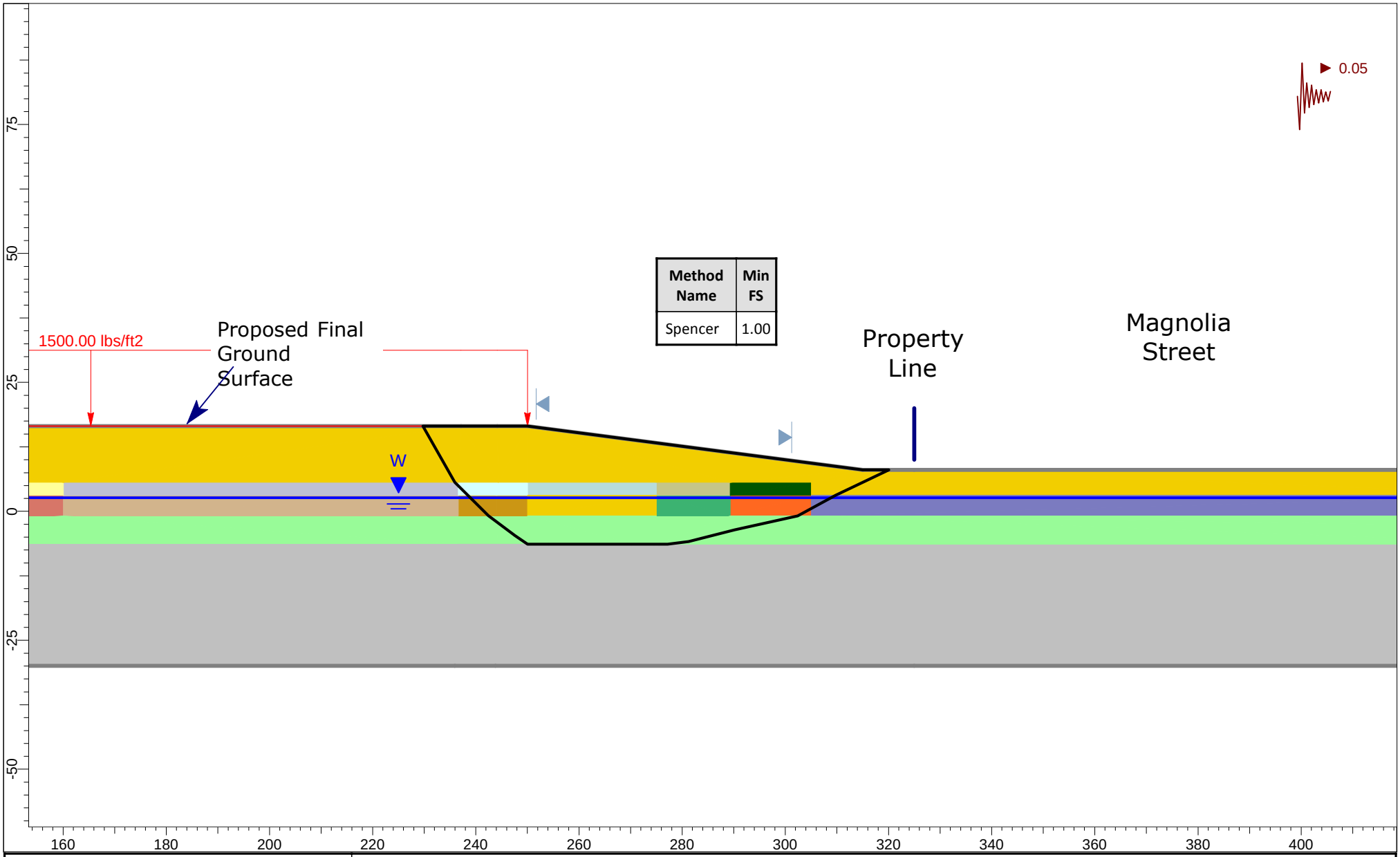
Project	HB Seaside Magnolia - EEI Project Number SHO-72233.4A		
Analysis Description	Seismic Deformation Slope Stability Analysis without Ground Improvement - Section A-A'		
Drawn By	Maurice Amendolagine	Scale 1:321	Company EEI Geotechnical and Environmental Solutions
Date	1/13/2016, 3:55:28 PM		File Name HB Seaside Seismic with Ground Imp.slim

EEI Geotechnical & Environmental Solutions

SLIDEINTERPRET 7.011



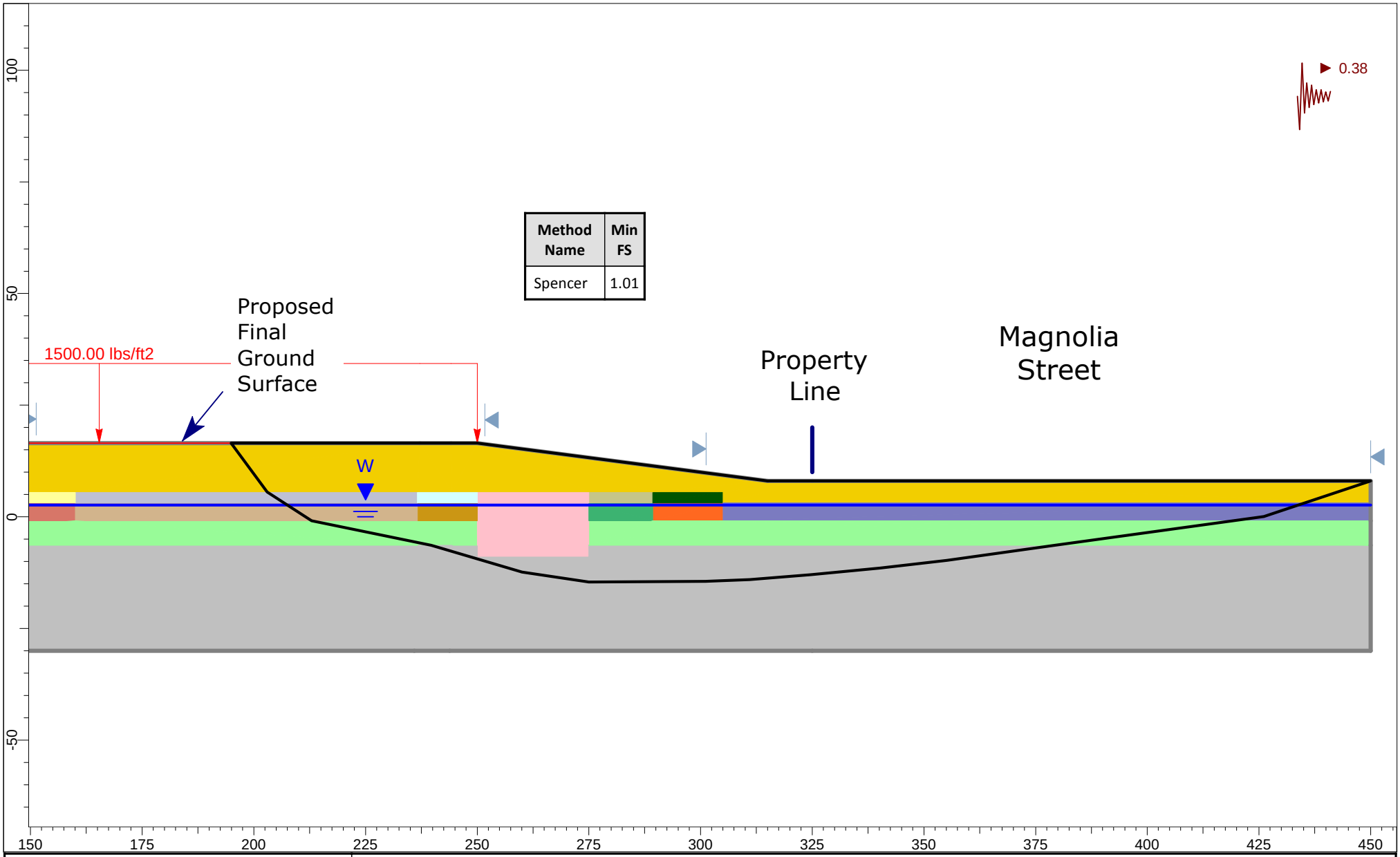
EEI Geotechnical & Environmental Solutions	Project: HB Seaside Magnolia - EEI Project Number SHO-72233.4A		
	Analysis Description: Seismic Slope Stability Analysis without Ground Improvement - Section B-B'		
	Drawn By: Maurice Amendolagine	Scale: 1:278	Company: EEI Geotechnical and Environmental Solutions
SLIDEINTERPRET 7.011	Date: 1/13/2016, 3:55:28 PM		File Name: HB Seaside Seismic without Ground Imp B-B'.slim



EEI Geotechnical & Environmental Solutions

SLIDEINTERPRET 7.011

Project	HB Seaside Magnolia - EEI Project Number SHO-72233.4A		
Analysis Description	Seismic Slope Stability Deformation Analysis without Ground Improvement - Section B-B'		
Drawn By	Maurice Amendolagine	Scale 1:309	Company EEI Geotechnical and Environmental Solutions
Date	1/13/2016, 3:55:28 PM		File Name HB Seaside Seismic Deformation without Ground Imp B-B'.slim



EEI Geotechnical & Environmental Solutions	Project: HB Seaside Magnolia - EEI Project Number SHO-72233.4A		
	Analysis Description: Seismic Deformation Slope Stability Analysis with Ground Improvement - Section B-B'		
	Drawn By: Maurice Amendolagine	Scale: 1:357	Company: EEI Geotechnical and Environmental Solutions
	Date: 1/13/2016, 3:55:28 PM		File Name: HB Seaside Seismic with Ground Imp B-B'.slim

SLIDEINTERPRET 7.011

APPENDIX E
EARTHWORK AND GRADING GUIDELINES

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EARTHWORK AND GRADING GUIDELINES

GENERAL

These guidelines present general procedures and recommendations for earthwork and grading as required on the approved grading plans, including preparation of areas to be filled, placement of fill and installation of subdrains and excavations. The recommendations contained in the geotechnical report are applicable to each specific project, are part of the earthwork and grading guidelines and would supersede the provisions contained hereafter in the case of conflict. Observations and/or testing performed by the consultant during the course of grading may result in revised recommendations which could supersede these guidelines or the recommendations contained in the geotechnical report. Figures A through O are provided at the back of this appendix, exhibiting generalized cross sections relating to these guidelines.

The contractor is responsible for the satisfactory completion of all earthworks in accordance with provisions of the project plans and specifications. The project soil engineer and engineering geologist (geotechnical consultant) or their representatives should provide observation and testing services, and geotechnical consultation throughout the duration of the project.

EARTHWORK OBSERVATIONS AND TESTING

Geotechnical Consultant

Prior to the commencement of grading, a qualified geotechnical consultant (a soil engineer and engineering geologist) should be employed for the purpose of observing earthwork procedures and testing the fills for conformance with the recommendations of the geotechnical report, the approved grading plans, and applicable grading codes and ordinances.

The geotechnical consultant should provide testing and observation so that determination may be made that the work is being completed as specified. It is the responsibility of the contractor to assist the consultant and keep them aware of work schedules and predicted changes, so that the consultant may schedule their personnel accordingly.

All removals, prepared ground to receive fill, key excavations, and subdrains should be observed and documented by the project engineering geologist and/or soil engineer prior to placing any fill. It is the contractor's responsibility to notify the engineering geologist and soil engineer when such areas are ready for observation.

Laboratory and Field Tests

Maximum dry density tests to determine the degree of compaction should be performed in accordance with American Standard Testing Materials test method ASTM designation D-1557-78. Random field compaction tests should be performed in accordance with test method ASTM designations D-1556-82, D-2937 or D-2922 & D-3017, at intervals of approximately two (2) feet of fill height per 10,000 sq. ft. or every one thousand cubic yards of fill placed. These criteria would vary depending on the soil conditions and the size of the project. The location and frequency of testing would be at the discretion of the geotechnical consultant

Contractor's Responsibility

All clearing, site preparation, and earthwork performed on the project should be conducted by the contractor, with observation by geotechnical consultants and staged approval by the appropriate governing agencies. It is the contractor's responsibility to prepare the ground surface to receive the fill to the satisfaction of the soil engineer, and to place, spread, moisture condition, mix and compact the fill in accordance with the recommendations of the soil engineer. The contractor should also remove all major deleterious material considered unsatisfactory by the soil engineer.

It is the sole responsibility of the contractor to provide adequate equipment and methods to accomplish the earthwork in accordance with applicable grading guidelines, codes or agency ordinances, and approved grading plans. Sufficient watering apparatus and compaction equipment should be provided by the contractor with due consideration for the fill material, rate of placement, and climatic conditions. If, in the opinion of the geotechnical consultant, unsatisfactory conditions such as questionable weather, excessive oversized rock, deleterious material or insufficient support equipment are resulting in a quality of work that is not acceptable, the consultant will inform the contractor, and the contractor is expected to rectify the conditions, and if necessary, stop work until conditions are satisfactory.

The contractor will properly grade all surfaces to maintain good drainage and prevent ponding of water. The contractor will take action to control surface water and to prevent erosion control measures that have been installed.

SITE PREPARATION

All vegetation including brush, trees, thick grasses, organic debris, and other deleterious material should be removed and disposed of offsite, and must be concluded prior to placing fill. Existing fill, soil, alluvium, colluvium, or rock materials determined by the soil engineer or engineering geologist as unsuitable for structural in-place support should be removed prior to fill placement. Depending upon the soil conditions, these materials may be reused as compacted fills. Any materials incorporated as part of the compacted fills should be approved by the soil engineer.

Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, or other structures not located prior to grading are to be removed or treated in a manner recommended by the soil engineer. Soft, dry, spongy, highly fractured, or otherwise unsuitable ground extending to such a depth that surface processing cannot adequately improve the condition should be over excavated down to firm ground and approved by the soil engineer before compaction and filling operations continue. Over excavated and processed soils which have been properly mixed and moisture-conditioned should be recompacted to the minimum relative compaction as specified in these guidelines.

Existing ground which is determined to be satisfactory for support of the fills should be scarified to a minimum depth of six (6) inches, or as directed by the soil engineer. After the scarified ground is brought to optimum moisture (or greater) and mixed, the materials should be compacted as specified herein. If the scarified zone is greater than 6 inches in depth, it may be necessary to remove the excess and place the material in lifts restricted to six (6) inches in compacted thickness.

Existing grind which is not satisfactory to support compacted fill should be over excavated as required in the geotechnical report or by the onsite soils engineer and/or engineering geologists. Scarification, discing, or other acceptable form of mixing should continue until the soils are broken down and free of large fragments or clods, until the working surface is reasonably uniform and free from ruts, hollows, hummocks, or other uneven features which would inhibit compaction as described above.

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical) gradient, the ground should be benched. The lowest bench, which will act as a key, should be a minimum of 12 feet wide and should be at least two (2) feet deep into competent material, approved by the soil engineer and/or engineering geologist. In fill over cut slope conditions, the recommended minimum width of the lowest bench or key is at least 15 feet with the key excavated on competent material, as designated by the Geotechnical Consultant. As a general rule, unless superseded by the Soil Engineer, the minimum width of fill keys should be approximately equal to one-half (½) the height of the slope.

Standard benching is typically four feet (minimum) vertically, exposing competent material. Benching may be used to remove unsuitable materials, although it is understood that the vertical height of the bench may exceed four feet. Pre stripping may be considered for removal of unsuitable materials in excess of four feet in thickness.

All areas to receive fill, including processed areas, removal areas, and toe of fill benches should be observed and approved by the soil engineer and/or engineering geologist prior to placement of fill. Fills may then be properly placed and compacted until design grades are attained.

COMPACTED FILLS

Earth materials imported or excavated on the property may be utilized as fill provided that each soil type has been accepted by the soil engineer. These materials should be free of roots, tree branches, other organic matter or other deleterious materials. All unsuitable materials should be removed from the fill as directed by the soil engineer. Soils of poor gradation, undesirable expansion potential, or substandard strength characteristics may be designated unsuitable by the consultant and may require mixing with other earth materials to serve as a satisfactory fill material.

Fill materials generated from benching operations should be dispersed throughout the fill area. Benching operations should not result in the benched material being placed only within a single equipment width away from the fill/bedrock contact.

Oversized materials, defined as rock or other irreducible materials with a maximum size exceeding 12 inches in one dimension, should not be buried or placed in fills unless the location of materials and disposal methods are specifically approved by the soil engineer. Oversized material should be taken offsite or placed in accordance with recommendations of the soil engineer in areas designated as suitable for rock disposal. Oversized material should not be placed vertically within 10 feet of finish grade or horizontally within 20 feet of slope faces.

To facilitate trenching, rock should not be placed within the range of foundation excavations or future utilities unless specifically approved by the soil engineer and/or the representative developers.

If import fill material is required for grading, representative samples of the material should be analyzed in the laboratory by the soil engineer to determine its physical properties. If any material other than that previously analyzed is imported to the fill or encountered during grading, analysis of this material should be conducted by the soil engineer as soon as practical.

Fill material should be placed in areas prepared to receive fill in near-horizontal layers that should not exceed six (6) inches compacted in thickness. The soil engineer may approve thicker lifts if testing indicates the grading procedures are such that adequate compaction is being achieved. Each layer should be spread evenly and mixed to attain uniformity of material and moisture suitable for compaction.

Fill materials at moisture content less than optimum should be watered and mixed, and "wet" fill materials should be aerated by scarification, or should be mixed with drier material. Moisture conditioning and mixing of fill materials should continue until the fill materials have uniform moisture content at or above optimum moisture.

After each layer has been evenly spread, moisture-conditioned and mixed, it should be uniformly compacted to a minimum of 90 percent of maximum density as determined by ASTM test designation, D 1557-78, or as otherwise recommended by the soil engineer. Compaction equipment should be adequately sized and should be reliable to efficiently achieve the required degree of compaction.

Where tests indicate that the density of any layer of fill, or portion thereof, is below the required relative compaction or improper moisture content, the particular layer or portion will be reworked until the required density and/or moisture content has been attained. No additional fill will be placed in an area until the last placed lift of fill has been tested and found to meet the density and moisture requirements, and is approved by the soil engineer.

Compaction of slopes should be accomplished by over-building the outside edge a minimum of three (3) feet horizontally, and subsequently trimming back to the finish design slope configuration. Testing will be performed as the fill is horizontally placed to evaluate compaction as the fill core is being developed. Special efforts may be necessary to attain the specified compaction in the fill slope zone. Final slope shaping should be performed by trimming and removing loose materials with appropriate equipment. A final determination of fill slope compaction should be based on observation and/or testing of the finished slope face.

If an alternative to over-building and cutting back the compacted fill slope is selected, then additional efforts should be made to achieve the required compaction in the outer 10 feet of each lift of fill by undertaking the following:

- Equipment consisting of a heavy short-shanked sheepsfoot should be used to roll (horizontal) parallel to the slopes continuously as fill is placed. The sheepsfoot roller should also be used to roll perpendicular to the slopes, and extend out over the slope to provide adequate compaction to the face slope.

- Loose fill should not be spilled out over the face of the slope as each lift is compacted. Any loose fill spilled over a previously completed slope face should be trimmed off or be subject to re-rolling.

- Field compaction tests will be made in the outer two (2) to five (5) feet of the slope at two (2) to three (3) foot vertical intervals, subsequent to compaction operations.

- After completion of the slope, the slope face should be shaped with a small dozer and then re-rolled with a sheepsfoot to achieve compaction to near the slope face. Subsequent to testing to verify compaction, the slopes should be grid-rolled to achieve adequate compaction to the slope face. Final testing should be used to confirm compaction after grid rolling.

- Where testing indicates less than adequate compaction, the contractor will be responsible to process, moisture condition, mix and recompact the slope materials as necessary to achieve compaction. Additional testing should be performed to verify compaction.

- Erosion control and drainage devices should be designed by the project civil engineer in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the soil engineer or engineering geologist.

EXCAVATIONS

Excavations and cut slopes should be observed and mapped during grading by the engineering geologist. If directed by the engineering geologist, further excavations or over-excavation and refilling of cut areas should be performed. When fills over cut slopes are to be graded, the cut portion of the slope should be observed by the engineering geologist prior to placement of the overlying fill portion of the slope. The engineering geologist should observe all cut slopes and should be notified by the contractor when cut slopes are started.

If, during the course of grading, unanticipated adverse or potentially adverse geologic conditions are encountered, the engineering geologist and soil engineer should investigate, evaluate and make recommendations to mitigate (or limit) these conditions. The need for cut slope buttressing or stabilizing should be based on as-grading evaluations by the engineering geologist, whether anticipated previously or not.

Unless otherwise specified in soil and geological reports, no cut slopes should be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies. Additionally, short-term stability of temporary cut slopes is the contractor’s responsibility.

Erosion control and drainage devices should be designed by the project civil engineer and should be constructed in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the soil engineer or engineering geologist.

SUBDRAIN INSTALLATION

Subdrains should be installed in accordance with the approved embedment material, alignment and details indicated by the geotechnical consultant. Subdrain locations or construction materials should not be changed or modified without approval of the geotechnical consultant. The soil engineer and/or engineering geologist may recommend and direct changes in subdrain line, grade and drain material in the field, pending exposed conditions. The location of constructed subdrains should be recorded by the project civil engineer.

COMPLETION

Consultation, observation and testing by the geotechnical consultant should be completed during grading operations in order to state an opinion that all cut and filled areas are graded in accordance with the approved project specifications.

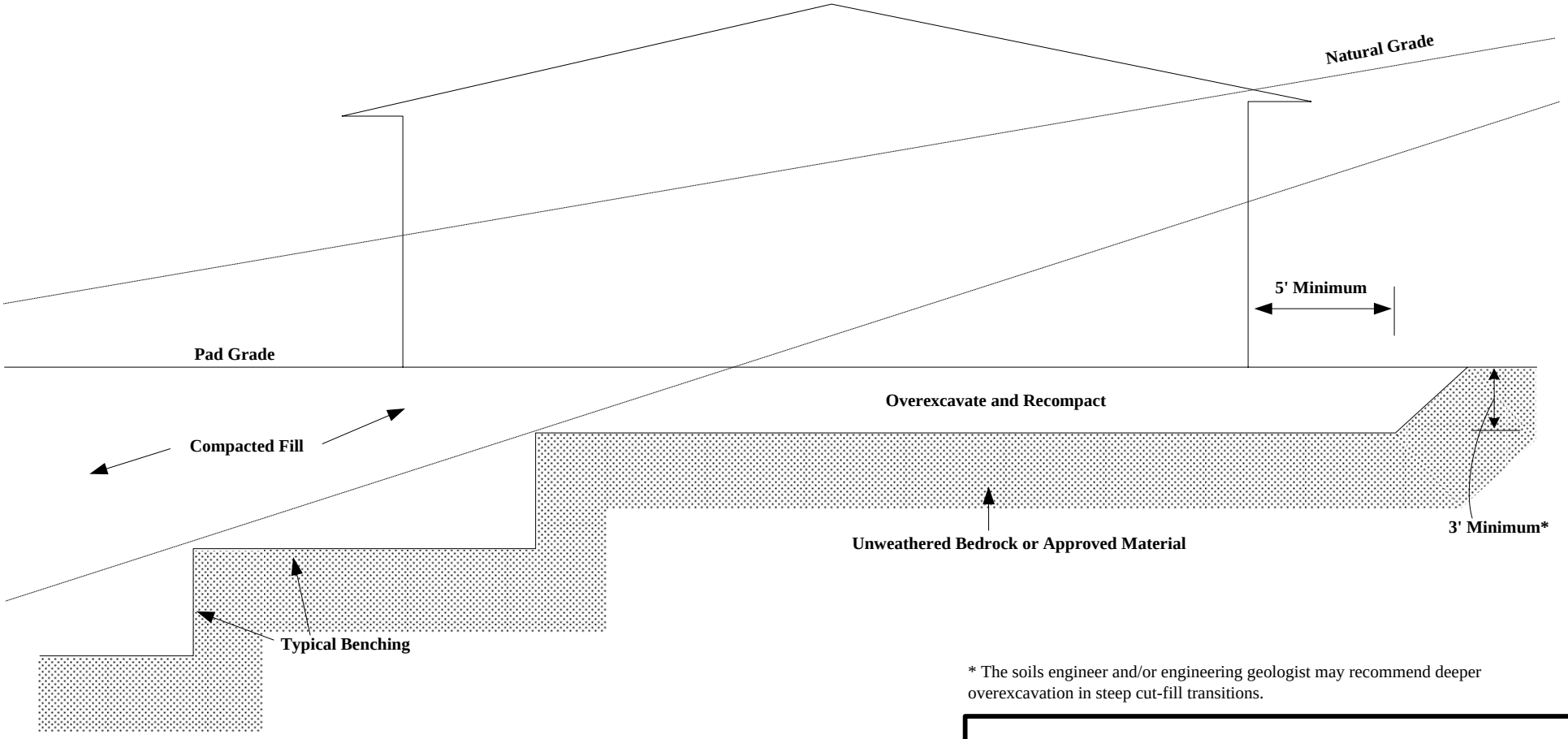
After completion of grading and after the soil engineer and engineering geologist have finished their observations, final reports should be submitted subject to review by the controlling governmental agencies. No additional grading should be undertaken without prior notification of the soil engineer and/or engineering geologist.

All finished cut and fill slopes should be protected from erosion, including but not limited to planting in accordance with the plan design specifications and/or as recommended by a landscape architect. Such protection and/or planning should be undertaken as soon as possible after completion of grading.

ATTACHMENTS

Figure A – Transition Lot Detail Cut Lot
Figure B – Transition Lot Detail Cut - Fill
Figure C – Rock Disposal Pits
Figure D – Detail for Fill Slope Toeing out on a Flat Alluviated Canyon
Figure E – Removal Adjacent to Existing Fill
Figure F – Daylight Cut Lot Detail
Figure G – Skin Fill of Natural Ground
Figure H – Typical Stabilization Buttress Fill Design
Figure I – Stabilization Fill for Unstable Material Exposed in Portion of Cut Slope
Figure J – Fill Over Cut Detail
Figure K – Fill Over Natural Detail
Figure L – Oversize Rock Disposal
Figure M – Canyon Subdrain Detail
Figure N – Canyon Subdrain Alternate Details
Figure O – Typical Stabilization Buttress Subdrain Detail
Figure P – Retaining Wall Backfill

TRANSITION LOT DETAIL
CUT LOT – MATERIAL TYPE TRANSITION



* The soils engineer and/or engineering geologist may recommend deeper overexcavation in steep cut-fill transitions.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
TRANSITION LOT DETAIL
CUT LOT – MATERIAL TYPE TRANSITION

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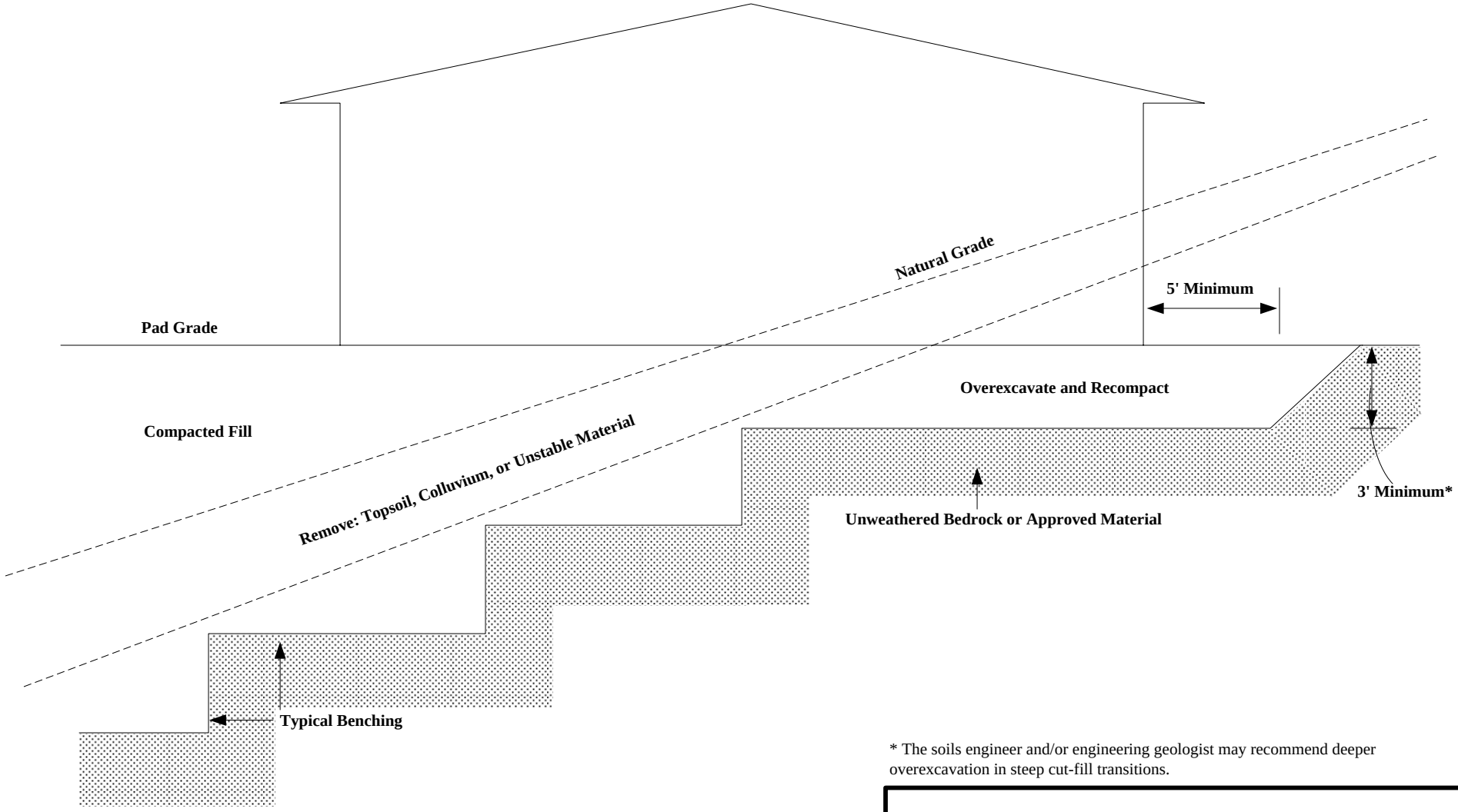
FIGURE A

TRANSITION LOT DETAIL
CUT – FILL – DAYLIGHT TRANSITION



* The soils engineer and/or engineering geologist may recommend deeper overexcavation in steep cut-fill transitions.

EARTHWORK AND GRADING GUIDELINES
TRANSITION LOT DETAIL
CUT – FILL – DAYLIGHT TRANSITION

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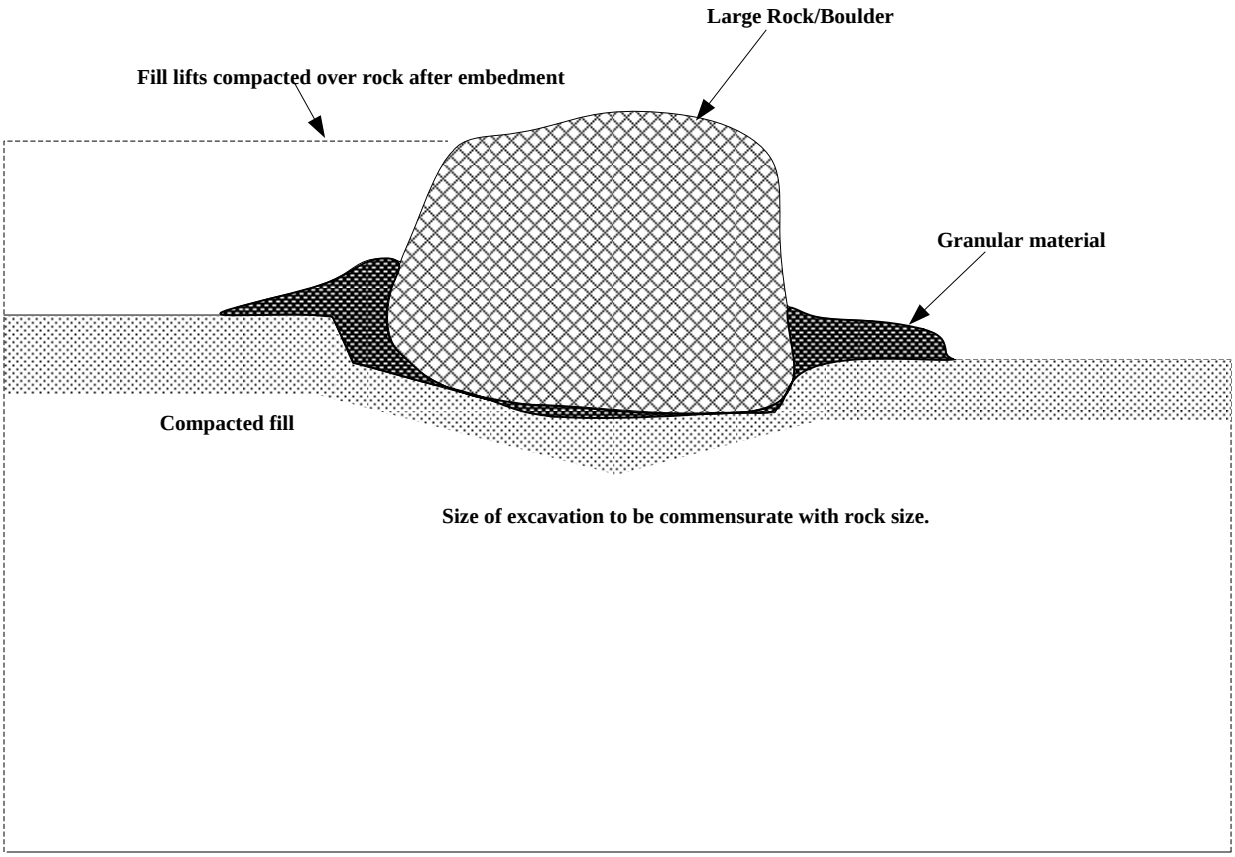
FIGURE B

Note: Figure not to scale

ROCK DISPOSAL PITS



Note: (1) Large rock is defined as having a diameter larger than 3 feet in maximum size.
(2) Pit shall be excavated into compacted fill to a depth equal to half of the rock size.
(3) Granular soil shall be pushed into the pit and then flooded around the rock using a sheepsfoot to help with compaction.
(4) A minimum of 3 feet of compacted fill should be laid over each pit.
(5) Pits shall have at least 15 feet of separation between one another, horizontally.
(6) Pits shall be placed at least 20 feet from any fill slope.
(7) Pits shall be used only in deep fill areas.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
ROCK DISPOSAL PITS

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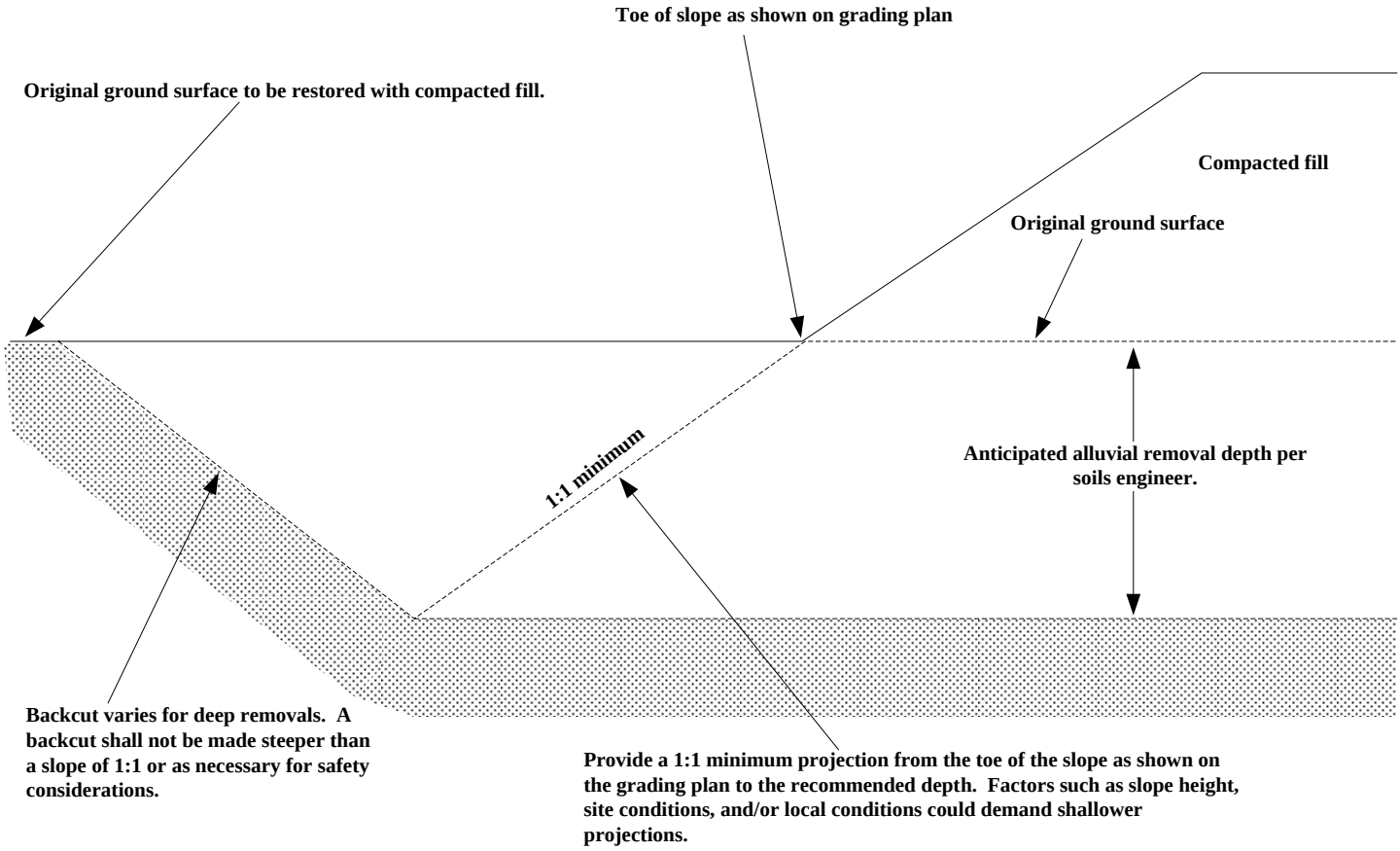
FIGURE C

DETAIL FOR FILL SLOPE TOEING OUT ON FLAT ALLUVIATED CANYON



Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
DETAIL FOR FILL SLOPE TOEING OUT ON A FLAT ALLUVIATED CANYON

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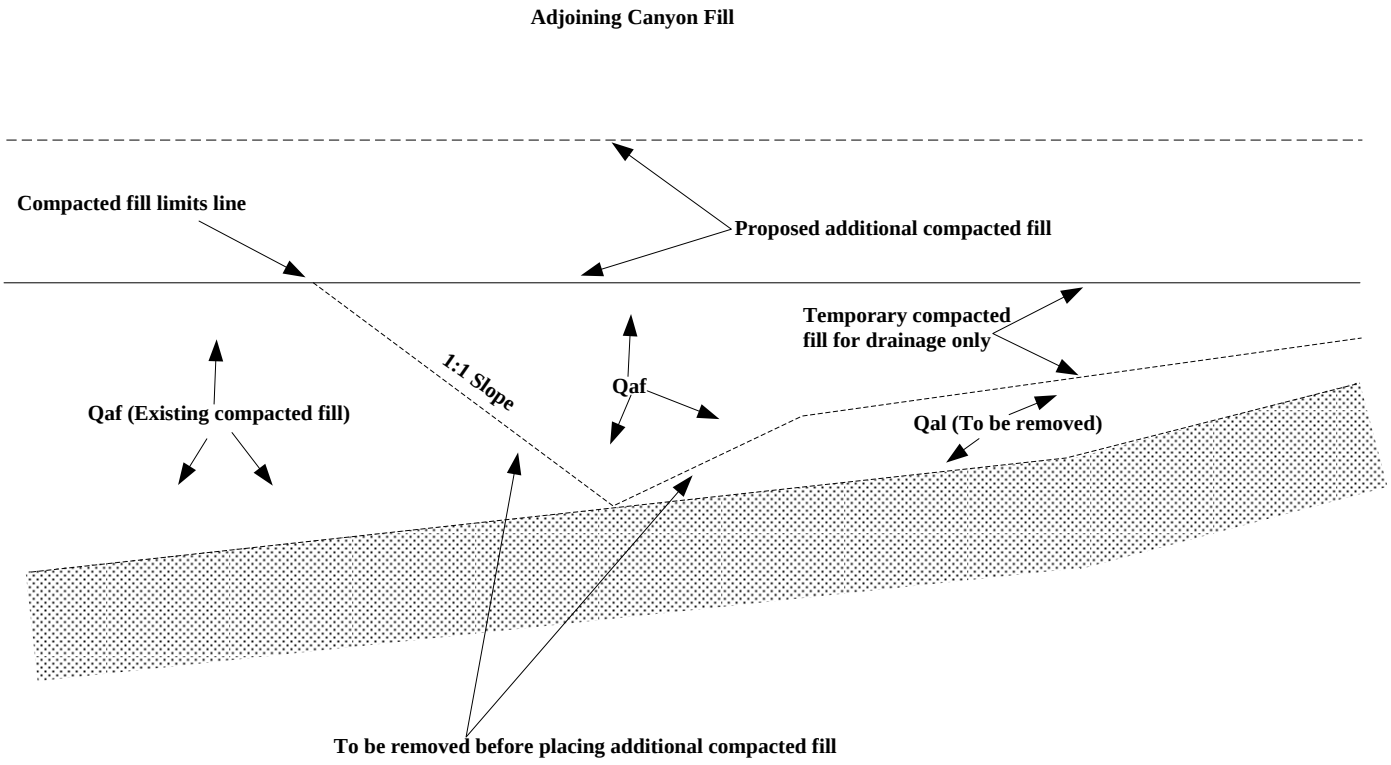
FIGURE D

REMOVAL ADJACENT TO EXISTING FILL



Legend

Qaf - Artificial Fill

Qal - Alluvium

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
REMOVAL ADJACENT TO EXISTING FILL

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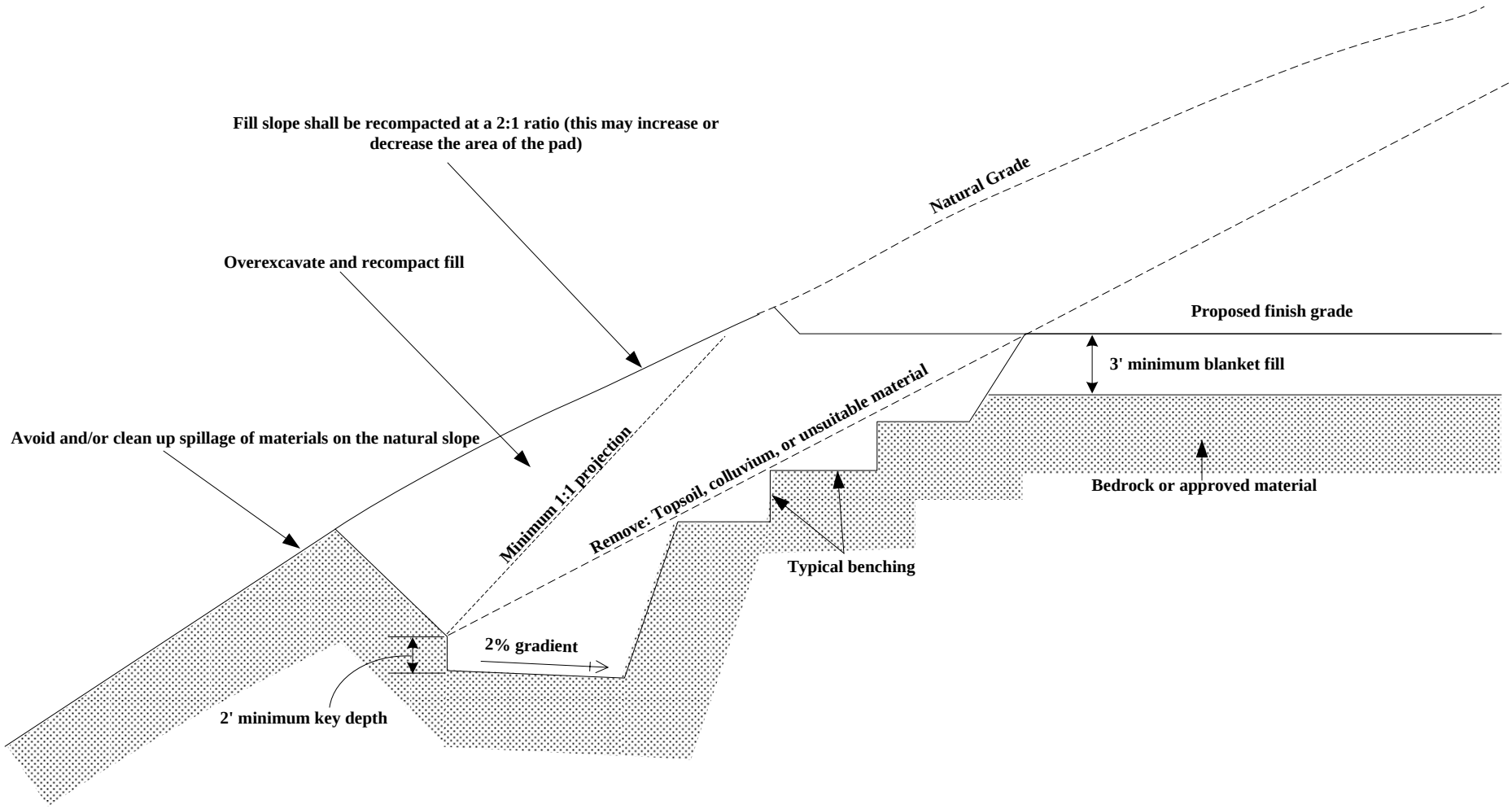
FIGURE E

DAYLIGHT CUT LOT DETAIL



Note: (1) Subdrain and key width requirements shall be determined based on exposed subsurface conditions and the thickness of overburden.

(2) Pad overexcavation and recompaction shall be completed if determined as necessary by the soils engineer and/or engineering geologist.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
DAYLIGHT CUT LOT DETAIL

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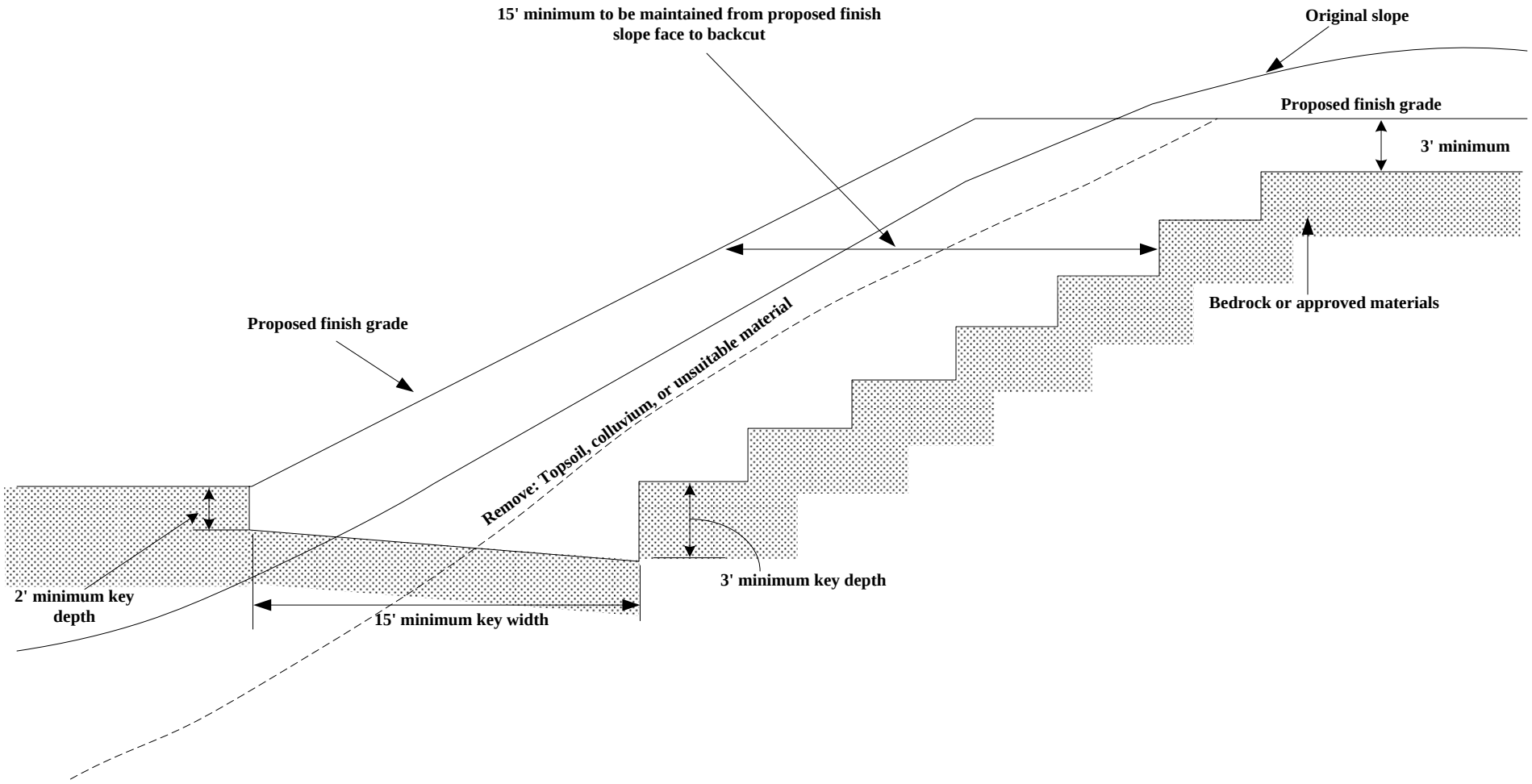
FIGURE F

SKIN FILL OF NATURAL GROUND



Note: (1) The need and disposition of drains will be determined by the soils engineer and/or engineering geologist based on site conditions.

(2) Pad overexcavation and recompaction shall be completed if determined as necessary by the soils engineer and/or engineering geologist.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
SKIN FILL OF NATURAL GROUND

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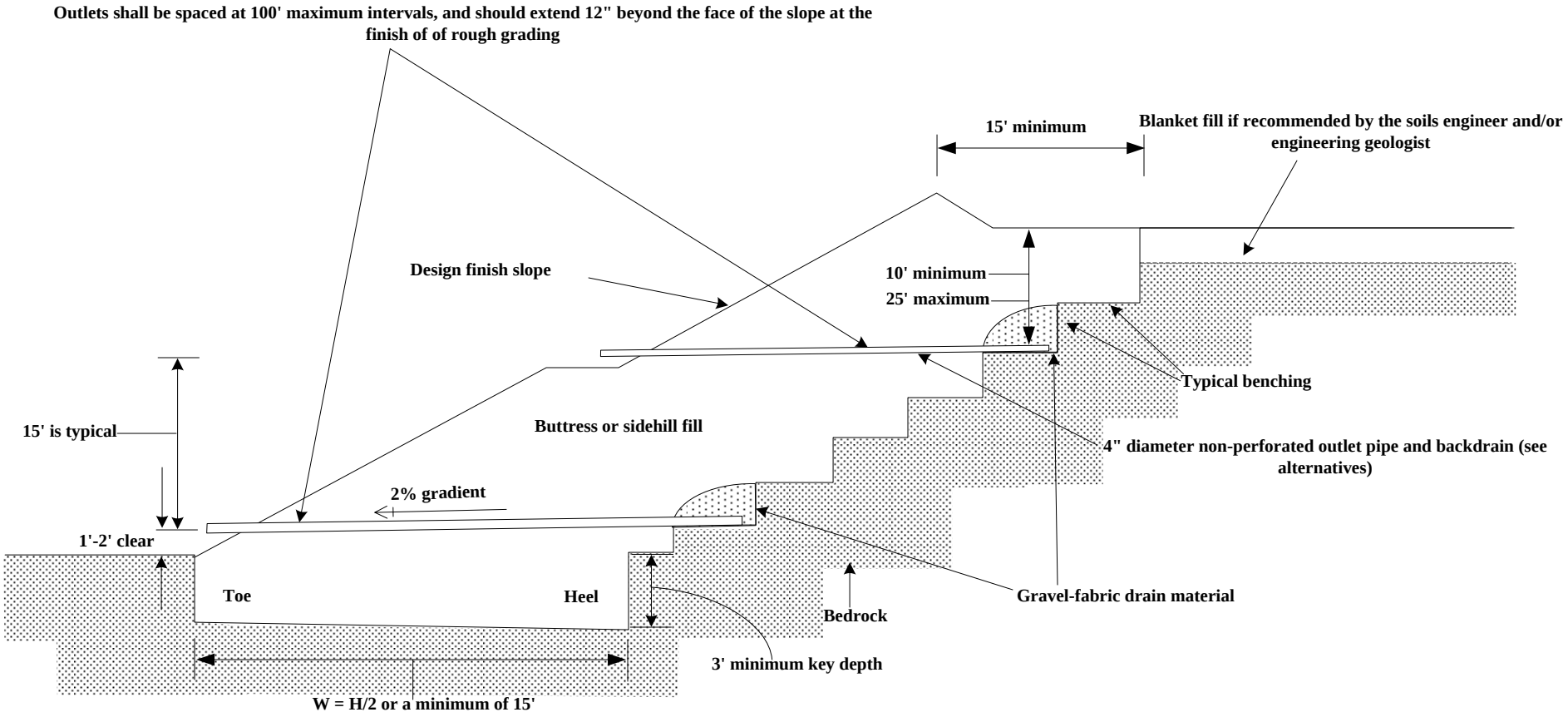
FIGURE G

TYPICAL STABILIZATION BUTTRESS FILL DESIGN



Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
TYPICAL STABILIZATION BUTTRESS FILL DESIGN

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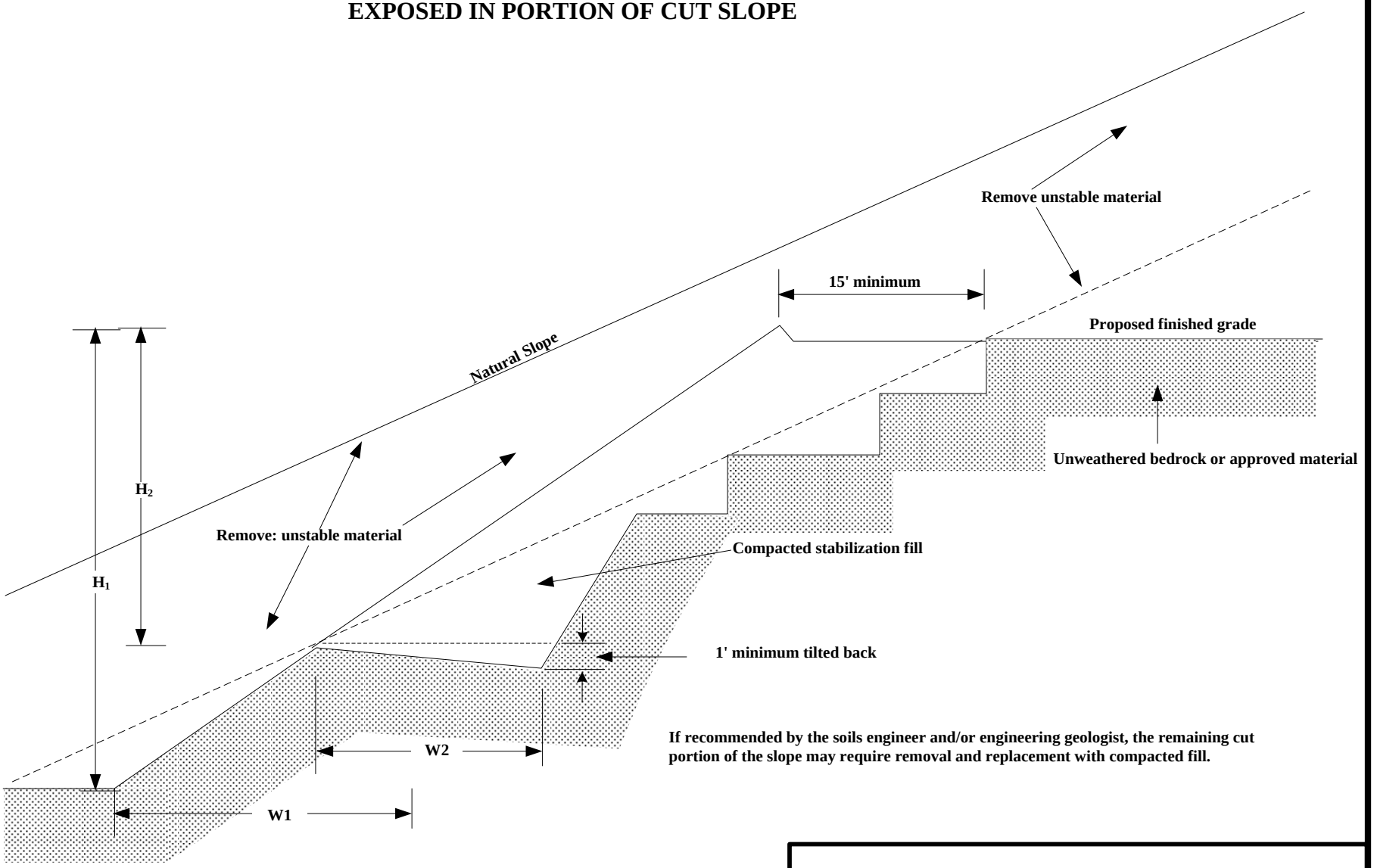
FIGURE H

STABILIZATION FILL FOR UNSTABLE MATERIAL EXPOSED IN PORTION OF CUT SLOPE



Note: (1) Subdrains are required only if specified by the soils engineer and/or engineering geologist.
(2) "W" shall be the equipment width (15') for slope heights less than 25 feet. For slopes greater than 25 feet "W" shall be determined by the project soils engineer and/or the engineering geologist. "W" shall never be less than H/2.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
STABILIZATION FILL FOR UNSTABLE MATERIAL EXPOSED IN PORTION OF CUT SLOPE

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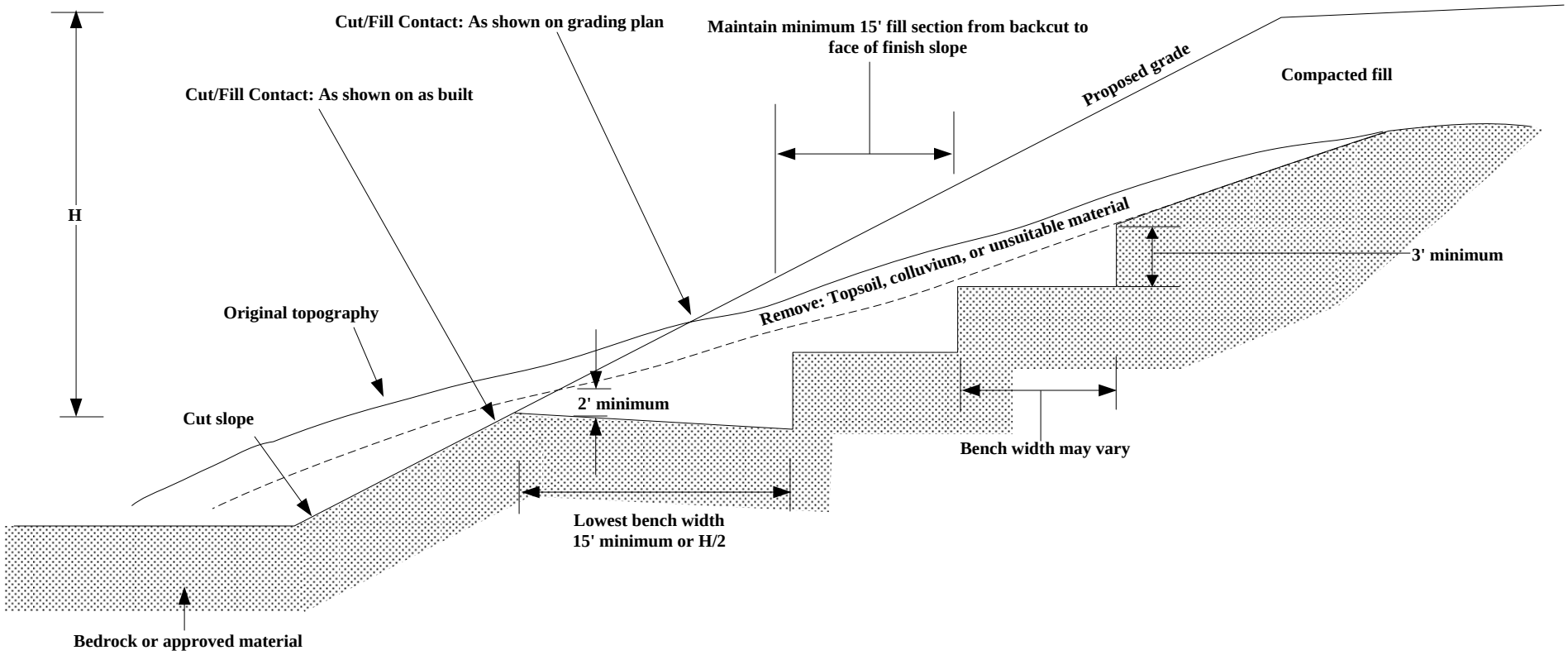
FIGURE I

FILL OVER CUT DETAIL



Note: The cut sectioin shall be excavated and evaluated by the soils engineer/engineering geologist prior to constructing the fill portion.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
FILL OVER CUT DETAIL

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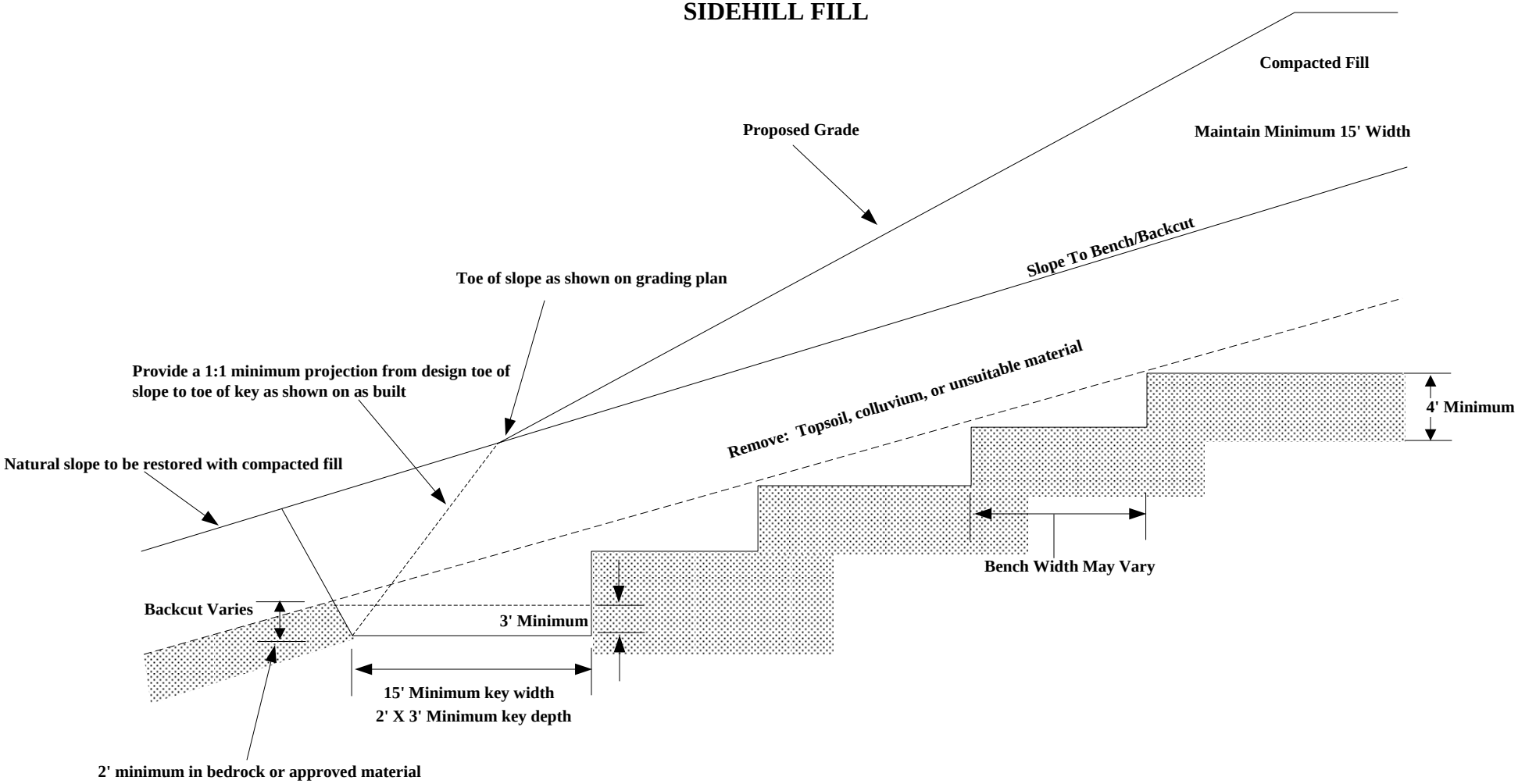
FIGURE J

FILL OVER NATURAL DETAIL
SIDEHILL FILL



Note: (1) Special recommendations shall be provided by the soils engineer/engineering geologist where the natural slope approaches or exceeds the design slope ratio.
(2) The need for and disposition of drains would be determined by the soils engineer/engineering geologist based upon exposed conditions.

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
FILL OVER NATURAL DETAIL
SIDEHILL FILL

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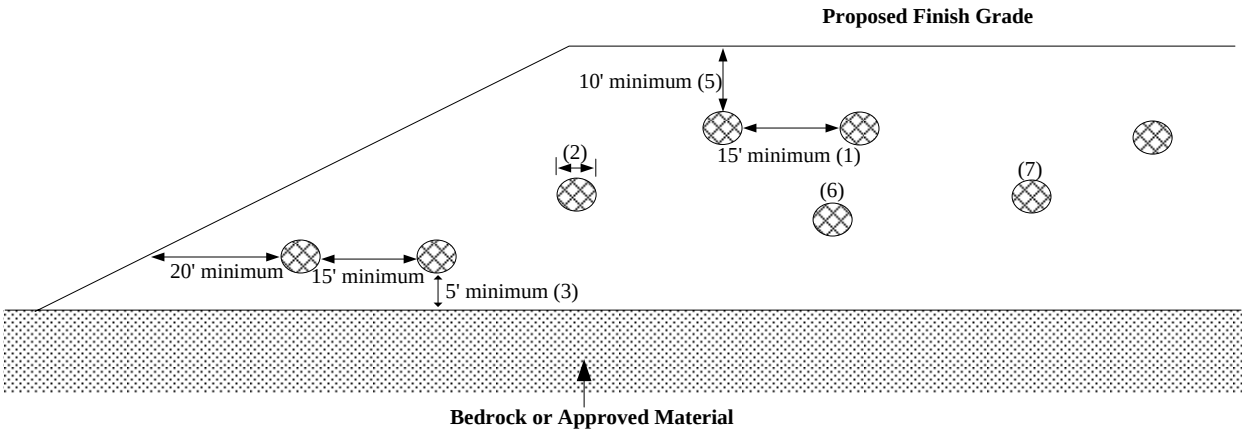
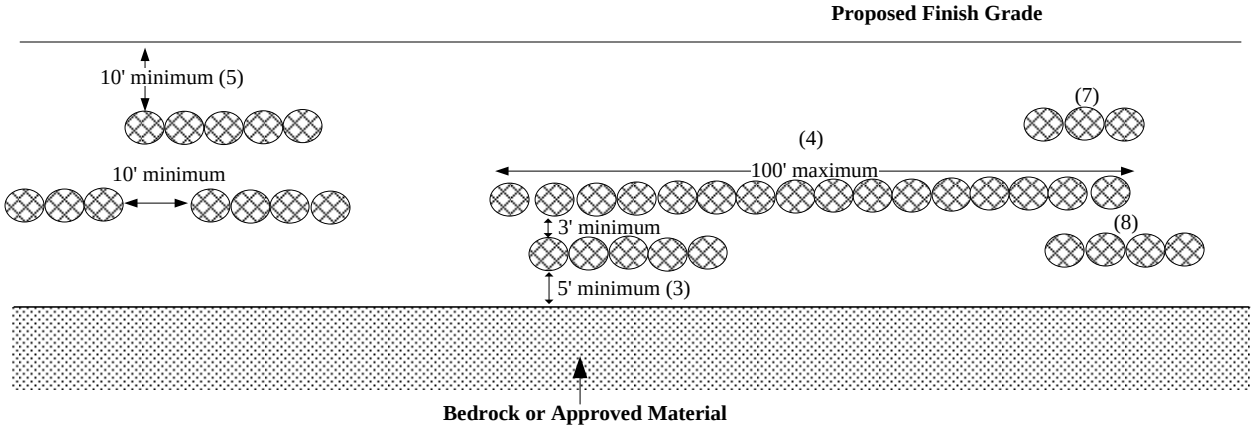
FIGURE K

OVERSIZE ROCK DISPOSAL

View Normal to Slope Face

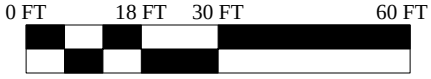


View Parallel to Slope Face



Note:
(1) One Equipment width or a minimum of 15 feet.
(2) Height and width may vary depending on rock size and type of equipment used. Length of windrow shall be no greater than 100 feet maximum.
(3) If approved by the soils engineer and/or engineering geologist.
(4) Orientation of windrows may vary but shall be as recommended by the soils engineer and/or engineering geologist. Unless recommended staggering of windrows is not necessary.
(5) Areas shall be cleared for utility trenches, foundations, and swimming pools.
(6) Voids in windrows shall be filled by flooding granular soil into place. Granular soil shall be any soil which has a unified soil classification system (Universal Building Code (UBC) 29-1). Designation of SM, SP, SW, GP, or GW.
(7) After fill between windrows is placed and compacted with the lift of fill covering windrow, windrow shall be proof rolled with a D-9 dozer or equivalent.
(8) Oversized rock is defined as larger than 12", and less than 4 feet in size.

Approximate Scale: 1" = 30'



Note: All distances are approximate

EARTHWORK AND GRADING GUIDELINES
OVERSIZE ROCK DISPOSAL

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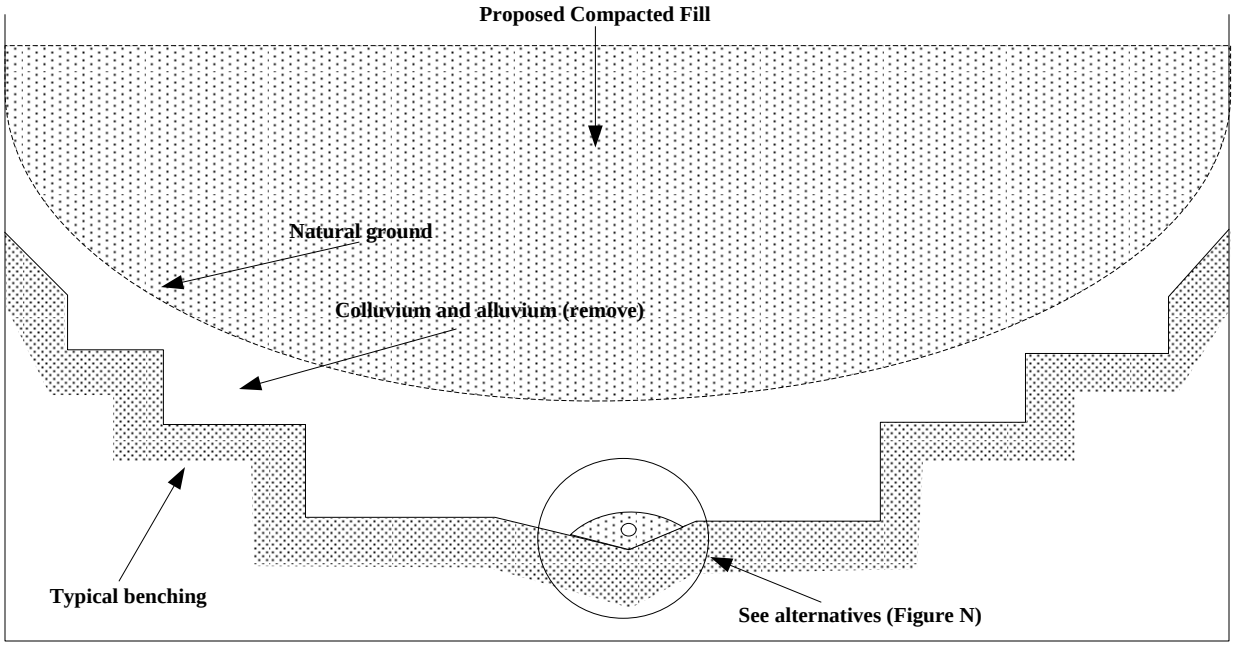
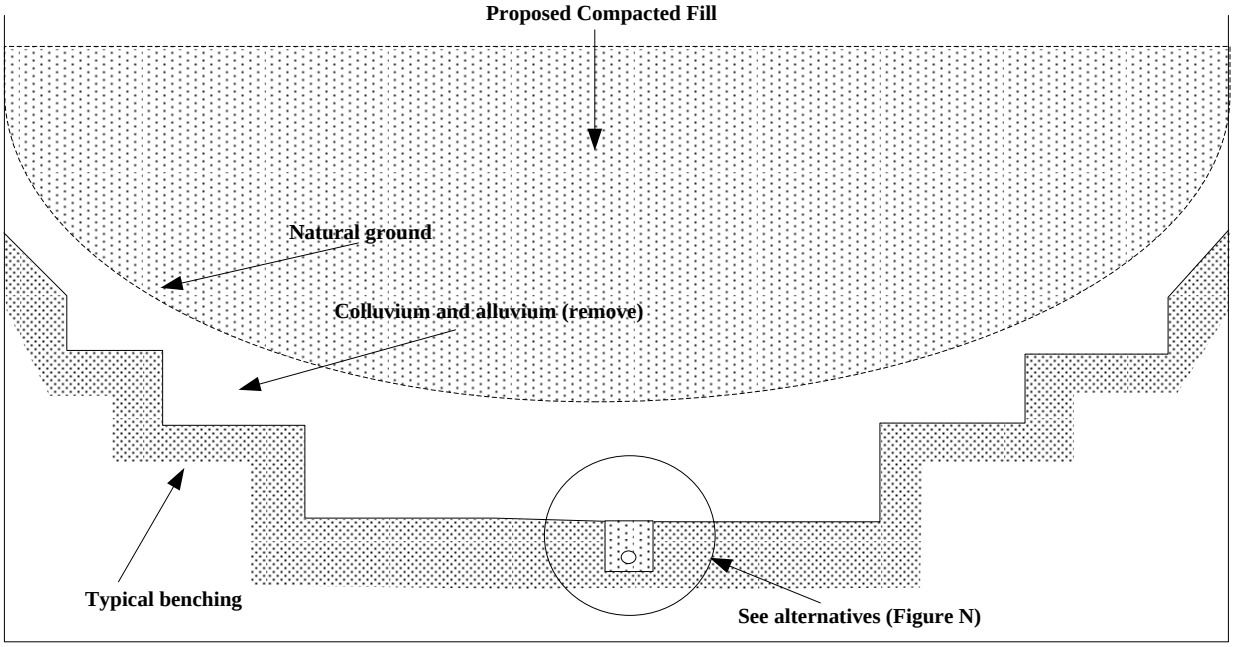
FIGURE L

CANYON SUBDRAIN DETAIL

Type A



Type B



Note: Alternatives, locations, and extent of subdrains should be determined by the soils engineer and/or engineering geologist during actual grading.

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
CANYON SUBDRAIN DETAIL

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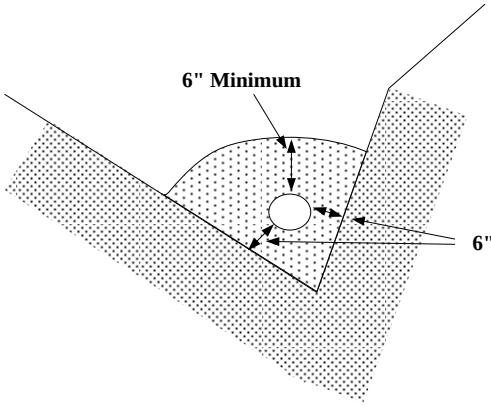
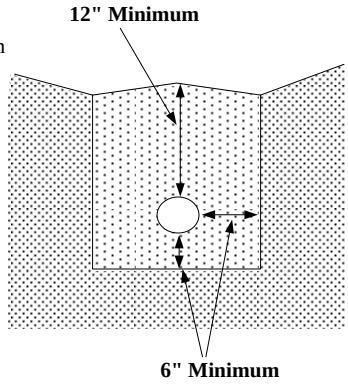
FIGURE M

CANYON SUBDRAIN ALTERNATE DETAILS

Alternate 1: Perforated Pipe and Filter Material



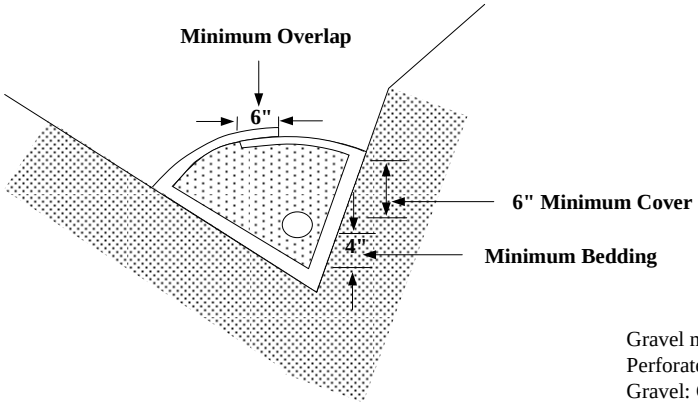
Filter material: Minimum volume of 9 feet^3/linear foot.
6" diameter ABS or PVC pipe or approved substitute with minimum 8 (¼" diameter) perforations per linear foot in bottom half of pipe.
ASTM D 2751, SDR 35 or ASTM D 1527, Schedule 40.
ASTM D 3034, SDR 35 or ASTM D 1785, Schedule 40.
For continuous run in excess of 500 feet use 8" diameter pipe.

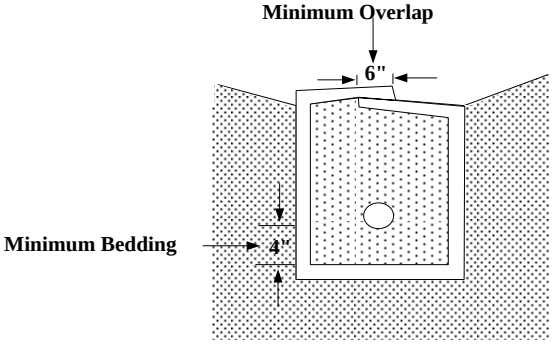


Filter Material

Sieve Size	Percent Passing
1"	100
¾"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

Alternate 2: Perforated Pipe, Gravel and Filter Fabric





Gravel material 9 feet^3/linear foot.
Perforated pipe: see alternate 1.
Gravel: Clean ¾" rock or approved substitute.
Filter Fabric: Mirafi 140 or approved substitute.

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
CANYON SUBDRAIN ALTERNATE DETAILS

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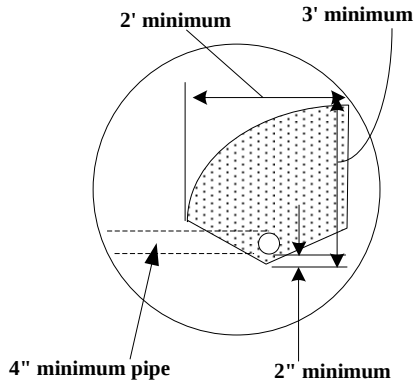
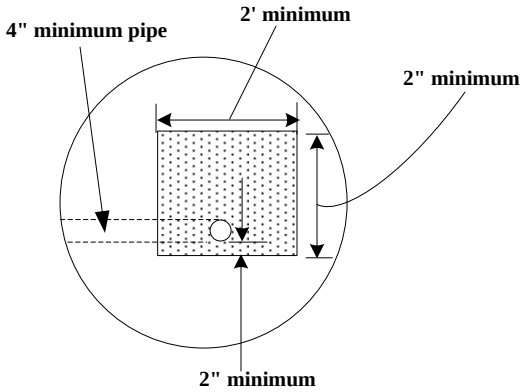
FIGURE N

TYPICAL STABILIZATION BUTTRESS SUBDRAIN DETAIL





Filter Material: Minimum of 5 ft^3/linear foot of pipe or 4 ft^3/linear foot of pipe when placed in square cut trench.

Alternative In Lieu Of Filter Material: Gravel may be encased in approved filter fabric. Filter fabric shall be mirafi 140 or equivalent. Filter fabric shall be lapped a minimum of 12" on all joints.

Minimum 4" Diameter Pipe: ABS-ASTM D-2751, SDR 35 or ASTM D-1527 schedule 40 PVC-ASTM D-3034, SDR 35 or ASTM D-1785 schedule 40 with a crushing strength of 1,000 pounds minimum, and a minimum of 8 uniformly spaced perforations per foot of pipe installed with perforations at bottom of pipe. Provide cap at upstream end of pipe. Slope at 2% to outlet pipe. Outlet pipe shall be connected to the subdrain pipe with tee or elbow.

Note: (1) Trench for outlet pipes shall be backfilled with onsite soil.
(2) Backdrains and lateral drains shall be located at the elevation of every bench drain. First drain shall be located at the elevation just above the lower lot grade. Additional drains may be required at the discretion of the soils engineer and/or engineering geologist.

Filter Material – Shall be of the following specification or an approved equivalent:

Filter Material

Sieve Size	Percent Passing
1"	100
¾"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

Gravel - Shall be of the following specification or an approved equivalent:

Filter Material

Sieve Size	Percent Passing
1½"	100
No. 4	50
No. 200	8

Sand equivalent: Minimum of 50

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
TYPICAL STABILIZATION BUTTRESS SUBDRAIN DETAIL

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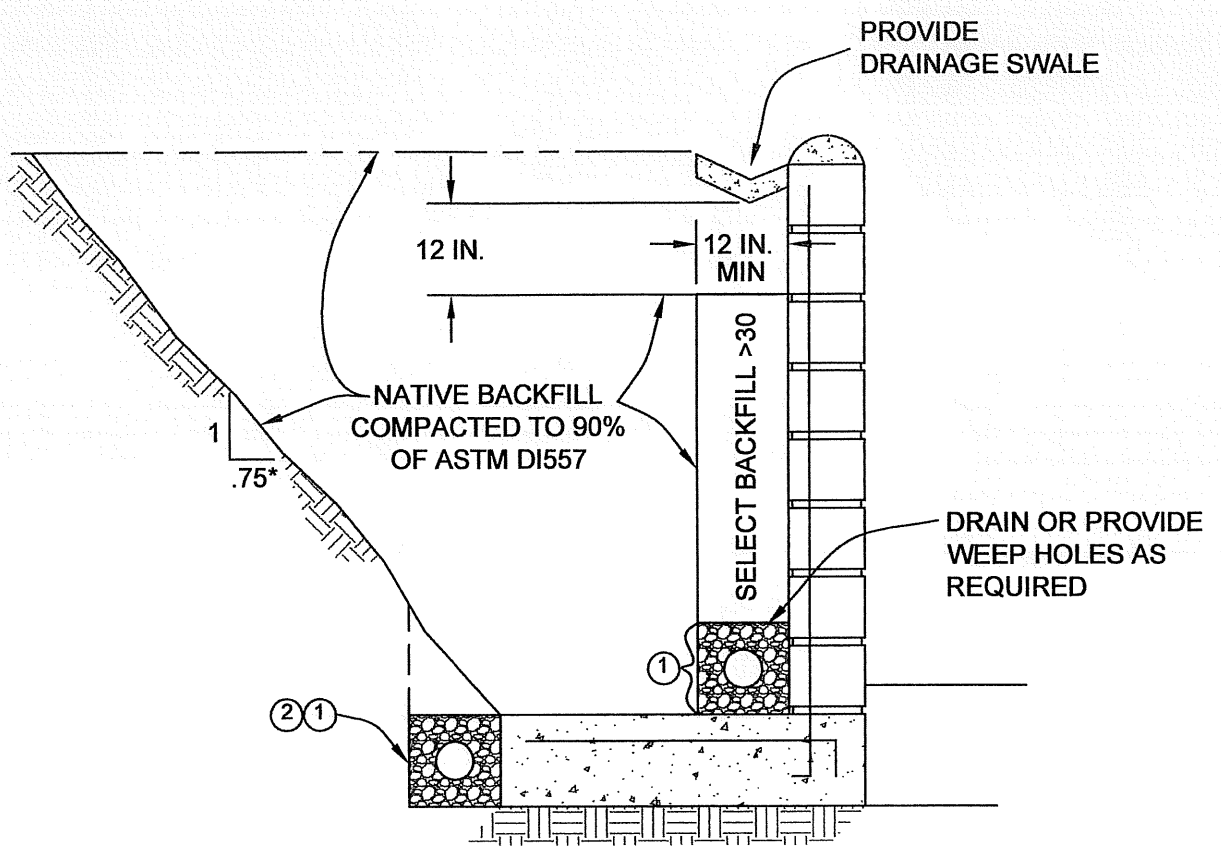
FIGURE O



* OR AS REQUIRED FOR SAFETY

NOTES

(1) 4-INCH PERFORATED PVC SCHEDULE 40 OR APPROVED ALTERNATE. PLACE PERFORATION DOWN AND SURROUND WITH A MINIMUM OF 1 CUBIC FOOT PER LINEAL FOOT (1 FT. /FT.) OF 3/4 INCH ROCK OR APPROVED ALTERNATE AND WRAPPED IN FILTER FABRIC.

(2) PLACE DRAIN AS SHOWN WHERE MOISTURE MIGRATION THROUGH THE WALL IS UNDESIRABLE.

NOTE: FIGURE NOT TO SCALE

EARTHWORK & GRADING GUIDELINES

TYPICAL RETAINING WALL BACKFILL

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FIGURE P

APPENDIX G

CEQA CHECKLIST

MAGNOLIA TANK FARM
CEQA CHECKLIST

1. Thresholds of Significance

California Environmental Quality Act (CEQA) significance criteria are used to evaluate the degree of impact caused by a development project on environmental resources such as hydrology and water quality. According to Appendix G of the CEQA Guidelines, a project would normally have a significant effect on the environment if the project would impact any of the items listed below.

2. Water Quality Thresholds

Would the Project:

A. Violate any water quality standards or waste discharge requirements?

B. Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?

C. Otherwise substantially degrade water quality?

D. Potentially impact stormwater runoff from construction activities?

E. Potentially impact stormwater runoff from post-construction activities?

F. Result in a potential for discharge of stormwater pollutants from areas of material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas, loading docks or other outdoor work areas?

G. Result in the potential for discharge of stormwater to affect the beneficial uses of the receiving waters?

H. Create or contribute significant increases in erosion of the project site or surrounding areas?

Should the answers to these environmental factors prove to be a potentially significant impact, mitigation measures would be required to reduce those impacts to a less-than-significant threshold.

2.1 WATER QUALITY IMPACTS

Impact A: Violate any water quality standards or waste discharge requirements?

Impact Analysis: A significant impact may occur if a project discharges stormwater which does not meet the quality standards of agencies that regulate surface water quality and water discharges into stormwater drainage systems. Water quality within the City of Huntington Beach is regulated by the Santa Ana Regional Water Quality Control Board (RWQCB). The primary water quality standards that apply to the Magnolia Tank Farm Project are related to activities during the construction and post-construction of the Project. As described in more detail in Impact Analyses D and E below, the primary mechanisms to ensure water quality standards are met are the Statewide General Construction Permit and the Orange County MS4 Permit. Both

of these regulatory guidelines will be followed and Best Management Practices (BMPs) will be implemented during both construction and post-construction phases of the Project. Implementation of these state and local requirements would effectively protect the Project from violating any water quality standards or waste discharge requirements from construction activities. No significant impacts are anticipated.

Impact B: Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?

Impact Analysis: Pollutants such as bacteria, metals, nutrients, oil & grease, organics, pesticides, sediment, and trash are anticipated to be generated at the Project site. However, the implementation of low impact development (LID) BMPs including harvest and reuse systems and biotreatment systems will greatly reduce the potential for these pollutants to discharge into receiving waters. In addition, certified full capture systems will be implemented in all catch basins on the property as required by the new statewide Trash Provisions to ensure trash does not discharge offsite. Therefore, substantial additional sources of polluted runoff are not anticipated to be a significant impact associated with the Project. Impacts related to the capacity of the storm water drainage systems are discussed in the Hydrology Report associated with the Magnolia Tank Farm Project, and therefore will not be discussed here.

Impact C: Otherwise substantially degrade water quality?

Impact Analysis: As a result of the construction-related, site design, LID and source control BMPs, water quality exceedances are not anticipated and pollutant loads are not expected to adversely affect beneficial uses in downstream receiving waters, such as the Huntington Beach Channel, Talbert Channel and the Pacific Ocean and Huntington Beach State Park.

Impact D: Potentially impact stormwater runoff from construction activities?

Impact Analysis: Construction activities within the Magnolia Tank Farm Project area would potentially result in soil erosion and temporary adverse impacts to surface water quality from construction materials and wastes if left unregulated or unmitigated.

Both State and Local regulations will effectively mitigate construction storm water runoff impacts from the proposed land use changes associated with the Project. Construction sites are required to prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the requirements of the Statewide General Construction Permit and subject to the oversight of the Santa Ana Regional Water Quality Control Board. The SWPPP must include BMPs to reduce or eliminate erosion and sedimentation from soil disturbing activities, as well as proper materials and waste management. Implementation of these requirements would protect stormwater runoff from any negative impacts from construction activities.

Impact E: Potentially impact stormwater runoff from post-construction activities?

Impact Analysis: In terms of post-construction related impacts, the incorporation of site design, LID features and BMPs as required under the North Orange County MS4 Permit, the Project water quality features will effectively retain or treat the 85th percentile 24-hour storm water runoff for pollutants such as bacteria, metals, nutrients, oil & grease, organics, pesticides, sediment and trash prior to discharge off the Project property. As the various drainage areas become developed, LID BMPs including harvest and reuse systems and biotreatment systems will be incorporated to ensure stormwater is retained onsite or treated. Therefore, long-term surface water quality of runoff from the Project area would be expected to improve over existing conditions as LID BMPs are implemented. No negative impacts to stormwater runoff from post-construction activities are anticipated.

Impact F: Result in a potential for discharge of stormwater pollutants from areas of material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas, loading docks or other outdoor work areas?

Impact Analysis: During construction activities, construction site wastes can range from residues collected from non-storm water discharges (i.e., paint removal) to general site litter and debris (i.e., empty marker paint cans). Materials and waste management BMPs will be implemented consistent with the requirements of the General Construction Permit to control how materials and wastes are stored and removed from the site.

During post-construction, due to local WQMP requirements, the Project will be required to control the generation of pollutants from source areas noted in Impact F, if they exist on-site. Non-structural and structural source control BMPs, in particular, will be required at trash storage areas, at any designated vehicle or equipment maintenance areas, drainage facilities, and landscaped areas to minimize the potential for pollutants to come into contact with stormwater runoff. In addition, an operations and maintenance plan is included in the WQMP (see Appendix D) that describes operation and maintenance requirements for all structural and treatment control BMPs.

During construction and post-construction, BMPs in compliance with the SWPPP and WQMP requirements will implemented. Therefore, the Project would result in less than significant impacts on discharge of stormwater pollutants from these activities.

Impact G: Result in the potential for discharge of stormwater to affect the beneficial uses of the receiving waters?

Impact Analysis: As mentioned, due to the implementation of stormwater BMPs during construction and post-construction phases of the Project, no negative impacts to the beneficial uses of the receiving waters are anticipated.

Impact H: Create or contribute significant increases in erosion of the project site or surrounding areas?

Impact Analysis: As mentioned in Impact Analysis C, construction of the Project will follow the requirements of the Statewide General Construction Permit and develop a SWPPP. The SWPPP will summarize proposed BMPs to reduce or eliminate erosion and sedimentation from soil disturbing activities, as well as proper materials and waste management. Therefore, increases in erosion of the Project site is not anticipated.